THE physical therapy REVIEW

Orthetics for Function

Part I. Prescription — BENNETT

Part II. Patient Training — STEPHENS

Fees for Rehabilitation and Treatment Centers — DOLNICK

Functional Method of Pre-Crutch Exercise — HICKOK and SCHILLER

Chapter Directory

Volume 36 - Number 11 **November 1956**

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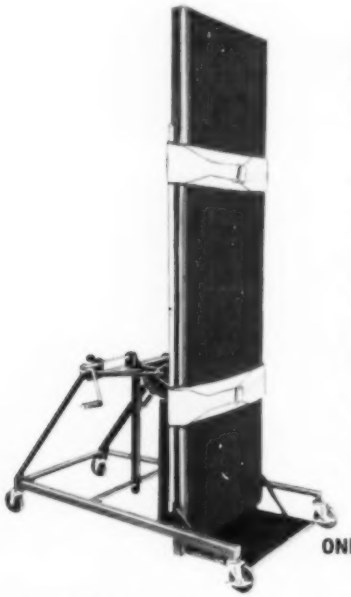

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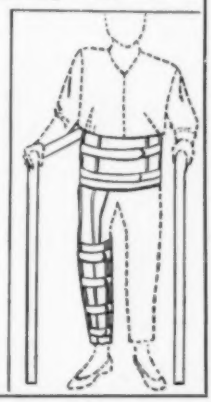

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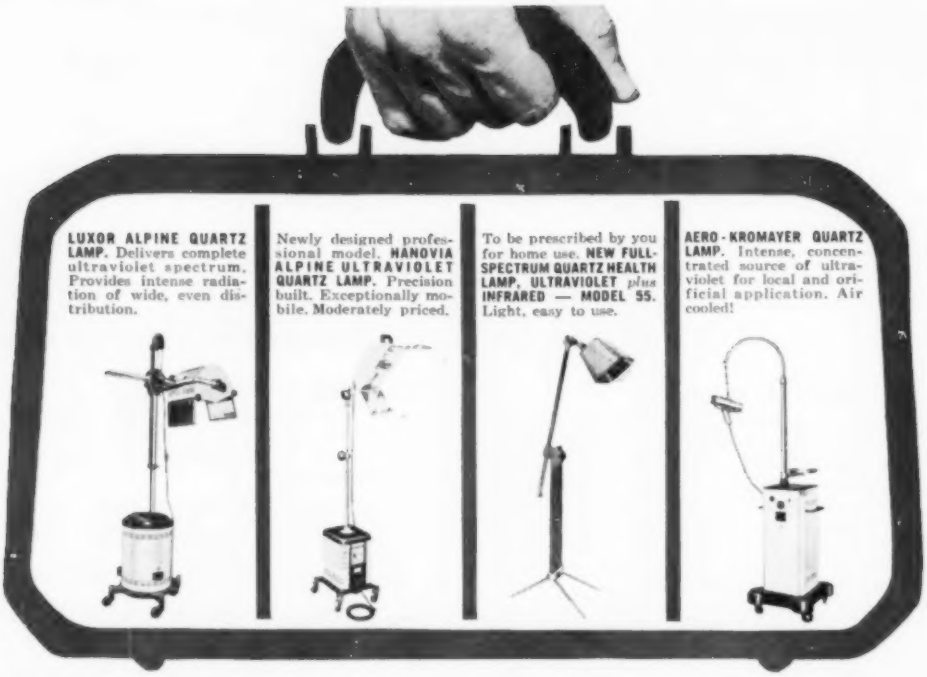
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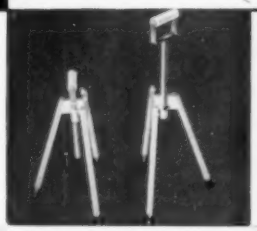

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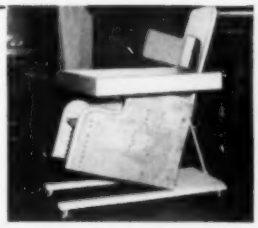

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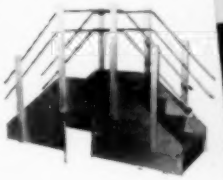

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708 Vol. 36, No. 11

published monthly by the
American Physical Therapy Association
at 1790 Broadway, Room 310
New York 19, N. Y.

Editor-in-Chief: SARA JANE HOUTZ

Associate Editor: BEATRICE WHITCOMB

Managing Editor: CAROL VANCE

Assistant Editors: HELEN HISLOP, MARY E. KOLB, RUTH M. LATIMER, KATHRYN SHAFFER

Membership in the American Physical Therapy Association is $20.00 a year, including a subscription to THE PHYSICAL THERAPY REVIEW. Subscriptions for nonmembers to THE PHYSICAL THERAPY REVIEW, $6.00 a year; $6.75 in Canada and foreign countries. Single copies 75 cents. (50 cents to members.) Reentered as second class matter August 11, 1949, at the post office at New York, N. Y., under the act of August 24, 1912.

The statements in the manuscripts published in THE PHYSICAL THERAPY REVIEW are made solely on the responsibility of the author. The American Physical Therapy Association does not assume any responsibility for statements contained therein. Manuscripts accepted for publication in THE PHYSICAL THERAPY REVIEW are for exclusive publication and may not be published elsewhere without permission.

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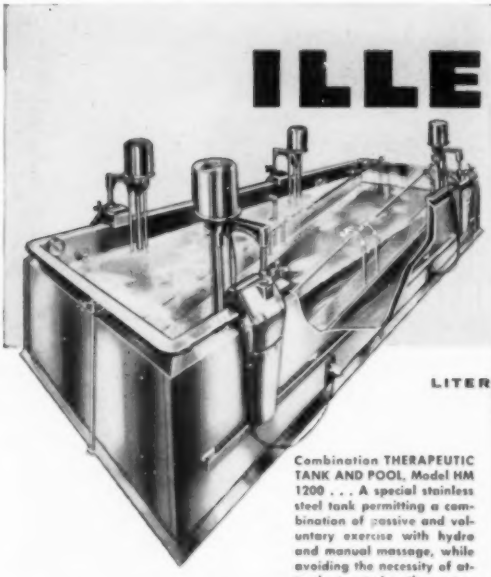

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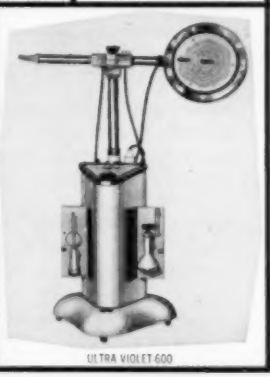
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Physical Therapy Offers You a Rewarding Career — An illustrated brochure with information for prospective students about physical therapy, the course of study, and opportunities for a career.

Physical Therapy Programs—1956—A list of schools approved by the Council on Medical Education and Hospitals of the American Medical Association.

Sources of Financial Assistance for Physical Therapy Student — 1956.

Poster: Join Ranks in a Proud Profession—Career poster for bulletin boards.

Career Facts—A brief on needs and opportunities.

Physical Therapy Record—A news tabloid with pictures depicting work of physical therapy for lay groups.

Open House Plans and Suggestions—A practical easy-to-use guide for a physical therapy department Open House for prospective students.

ORGANIZATION

Code of Ethics of the American Physical Therapy Association.

Personnel Policies for Physical Therapists.

Use of Nonprofessional Personnel — An illustrated pamphlet to assist the physical therapist to determine the need for nonprofessional personnel and to give guidance on inservice training and utilization.

Approved Schools and Courses of Physical Therapy 1928-1954.

Essentials of a Hospital Department — Physical Therapy (To members 25¢).

State Registration of Physical Therapists—Abstracts of state laws regarding registration of physical therapists.

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SCIENTIFIC REPRINTS

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Recruitment

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Functional Issue (November 1949) (25¢)

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Abstracts Reprinted

"Haltung," an Abstract from Body Posture by Magnus, and "Head Posture and Muscle Tone," Clinical Observations by A. Simons, abstracted by Signe Brunnstrom, have been reprinted in one pamphlet.

Reprints can be ordered from the American Physical Therapy Association, 1790 Broadway, New York 19, New York. The cost of the pamphlet containing both abstracts is 50¢ (in quantities of 10 or more, 25¢).

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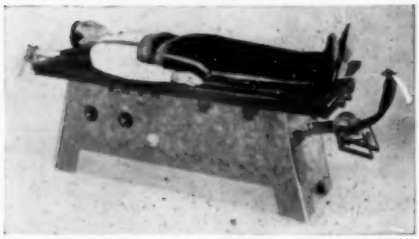

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WORD LOOKER-UPPER

I never could spell so I have had to resort to Mr. Webster when writing the merest note to my secretary. Invariably my eye leads me to two other words. One above and one below the one I am searching for. They are so interesting that these two lead to four, then to eight, and frequently to eleven pages of fine print in the encyclopedia. Here I exhaust some subject which I never heard of before or will perhaps again.

This way one accumulates an abundance of worthless knowledge and a nodding acquaintance with a large number of words; that is, if he is a real dedicated "looker-upper." One day I looked up the word "zarf." This led me to "finjan" and this to an exhaustive study of the "Levantine." I won't tell you how you can get through this tortuous path. If you are curious, try it yourself. It's lots of fun and puts you in position to influence your friend—to go away, that is.

When I am not exhausting myself in such studies, I manage to make visits around where some Physical Therapy is being employed. Last week I visited a GP in a small town who, with his two Therapists, practices sincere Physical Therapy along with his medicine, minor surgery, and all the usual things required of a village doctor.

I interviewed five patients who have been under Ultrasonic treatment for periods varying from four days to fifteen weeks. I studied the case histories, saw x rays and all other diagnostic data as Dr. "S" told me of these cases. One was a 37 year old bus driver—rheumatoid arthritis—walked with two crutches when he first came in—can't work. Another had chronic asthma—but had an acute attack just before his first treatment. Another was a 62 year old man with a brace and crutches worn for five years as a result of injuries received when he fell thirty feet into an excavation. One had sinusitis and another bursitis; both conditions were acute just a week ago. These patients were all treated thoroughly with Ultrasonic energy—two received other measures of physical medicine also, and the rheumatoid patient took twelve aspirin tablets as well as a daily Ultrasonic treatment. If Dr. "S" published the spectacular results he has had on these five cases (and many others) he'd be asked, probably, to appear before some investigative committee of his local society.

——0——

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The Physical Therapy Review

Official Publication of The American Physical Therapy Association

Vol. 36 November 1956 Number 11

Orthetics for Function Part I: Prescription

Robert L. Bennett, M.D. (U.S.A.)

It is the purpose of this discussion to bring to the attention of the physical therapist the reasons underlying the physician's prescription of various orthetic devices used at Warm Springs. Because our time is limited, only points of particular importance and interest will be discussed, and only in that phase of orthetics dealing with the use of devices that serve to increase safe and practical activity of patients with muscular weakness. To my knowledge, the words, "orthesis," "orthetics," and "orthetic devices," have not been used before and are not in any existing dictionary. The word "orthesis" may be defined as a medically prescribed device applied to or around a weakened bodily segment to give support and increased function. This word is used in contradistinction to prosthesis which means a "replacement of a missing part by an artificial substitute." Similarly, orthetic pertains to orthesis as prosthetic to prosthesis. Orthotist is already an accepted word and is used to designate the person who constructs orthetic devices. Braces, splints, crutches, corsets, feeders, wheel chairs, hoists, reachers, page turners, typing sticks, and the countless number of devices to adapt normally used objects to use by the physically handicapped—all come within the field of orthetics. Frankly, the word was conceived of the necessity to find a simple title for this discussion and the accompanying exhibit.

When normal muscle balance and use are disturbed, either for a temporary or permanent period of time, it is frequently necessary to prescribe orthetic devices to obtain safe activity for the recovery of functional capacity. This does not mean that such devices must be used in every case where muscle power or joint alinement is disturbed. It must be clearly understood that the use of orthetic devices is necessary only when function is a desirable or necessary part of treatment and when such a device will enable the patient to carry out this function with safety. Activity is the most beneficial and, at the same time, the most dangerous ingredient of the prescription necessary for the adequate care of diseases characterized by muscular weakness. Activity is obviously necessary for the recovery of strength because there can be no dispute that strength, as well as coordination and endurance, can never be recovered by keeping the patient motionless in bed. However, in the very simplicity of this fact lies the dangers of haphazard or overactivity. It must be thoroughly appreciated by both the physician and therapist that overactivity has at least three dangers: (1) overactivity can cause structural distortion of involved bodily segments; (2) overactivity can promote the development of faulty patterns of

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Read at the Second Congress of the World Confederation for Physical Therapy, held in New York, June, 1956. This paper will appear in the published *Proceedings*.

bodily movement, and (3) overactivity can actually cause the loss of muscle strength. Structural deformities or distortion of bony alinement, or contractures about joints, will occur eventually even in normal persons if the bodily segments are placed repeatedly in faulty position. The muscular weakness that characterizes many neuromuscular and musculoskeletal diseases and the demineralization that occurs with disuse and inactivity permit rapid changes in the contour of bone and mobility about joints. Thus, while prescribed activity is necessary for prevention of deformity, overactivity can cause or accelerate deformity. This is obviously the reason that certain orthetic devices may be necessary during all phases of recovery of neuromuscular disease if a patient's own muscles are too weak to support the necessary activity. Such devices properly designed, fitted, and used, permit and encourage early, safe activity and become a part of the over-all treatment essential to recovery or to the continued security of permanently weakened segments. It must be emphasized again that such devices are to be discarded as soon as recovery occurs in the patient's own musculature to the degree of strength sufficient to maintain proper alinement of bone and joint. The development of faulty patterns of movement may interfere with complete recovery or maximum recovery of functional activity. The purpose of treatment is to recover completely the effective use of the neuromuscular system or to use with greatest effectiveness those remaining neuromuscular units if some irreversible pathology has occurred. If patients are permitted haphazard activity during the period of expected recovery, movements are attempted only with those muscle groups that are stronger and under some voluntary control. This results in abnormal or substitution patterns of motion that are not only inefficient, awkward, and fatiguing, but also are patterns that ignore the weaker groups which cannot, at that time, take part in the activity. As these movements are repeated they become habitual and are difficult, or even impossible, to break—even though the unused groups recover physiological excitability. If intact motor units are not used, or are used inefficiently, maximum recovery is not possible.

Perhaps the greatest danger of overactivity lies in overwork of muscle. Too few of us appreciate the damaging effects of persistent overwork of the neuromuscular system even in the normal person. Overwork of muscles, particularly when coupled with faulty patterns of motion, is the most common cause of incomplete recovery as well as actual loss of strength following neuromuscular and musculoskeletal disease. Certainly it should be a basic principle in treatment that muscle groups must never be encouraged to repeatedly bear stresses beyond their strength to hold.

This emphasis on, first, the need for activity, and, second, the dangers of overactivity should serve to point out the fact that orthetic devices should permit and even encourage function but, at the same time, should provide this desirable function with greatest safety. Early function should never be obtained at the expense of later loss of muscle strength and the development of structural deformity.

When prescribing this type of orthetic device the physician must keep certain criteria constantly in mind: (1) The device must serve a real need. Applying unnecessary apparatus can be just as dangerous as not applying necessary apparatus. (2) The device prescribed must be of a design that can be constructed and, as necessary, be repaired by any good orthotist. (3) The device should be as light weight as possible but must also be capable of standing up under expected wear. (4) The device must be reasonable in cost. (5) The device must be sufficiently simple that it can be properly applied by the patient or his family. (6) The device must be acceptable in appearance, and (7) must in no way endanger the structural security of bodily segments through its use.

Functional orthetic devices can be most easily discussed in relation to the bodily segments to which they are applied. For all practical purposes, the segments may be divided into (1) the lower extremities, (2) the forearm and hand, (3) the shoulder, and (4) the trunk.

LOWER EXTREMITY ORTHETICS

Indications

1. Support and aline foot.
2. Support and position knee.
3. Support and control hip.

Long leg brace.—The long leg brace is the basic device used to fulfill the objectives of the above indications. Despite common usage, many physicians fail to appreciate the importance of design and fit.

Points of emphasis

1. A long leg brace should be made of metal as light weight as can be expected to stand up under the activity demanded by the patient, but weight is not as important as design and fit.

2. The long leg brace should extend to within ½ inch to ¾ inch of the ischial tuberosity. If the brace is higher, it tends to pinch the patient and will not permit him to get his hips properly under him when standing and walking. That is, he tends to walk in a quadruped position. If the brace is too short the patient will tend to "sit back" in the brace and not get his hips under him properly.
3. The knee joint should not be at the level of the anatomic knee joint but rather at the level of the greatest prominence of the internal condyle of the knee. If the knee hinge is too high, the mid-thigh band will press into the thigh uncomfortably when the knee is flexed. If the knee hinge is too low the calf band will press uncomfortably into the calf of the leg when the hinge is bent. The proper placement of the knee hinge determines in large part the comfort of the brace when the patient is sitting down.
4. Relationship of the depth of the upper thigh and mid-thigh bands determines the position of the knee when the patient is standing. If the upper thigh band is deep and the mid-thigh band shallow, the patient's knee will be flexed. If the upper thigh band is shallow and the mid-thigh band deep the knee will hyperextend. It is to be emphasized that anteroposterior positioning of the knee (flexion, extension, and hyperextension) is accomplished by the proper relationship between the depth of the upper thigh band and the mid-thigh band.
5. The calf band is not used to position the knee. Its sole purpose is to give stability and rigidity to the uprights of the brace below the knee.
6. For convenience in removing the brace from the shoe, the points are made to fit a channel situated in the heel of the shoe. This means that the joint of the brace is not level with the anatomic ankle joint of the patient. We have found that there are no significant disadvantages to this placement of the ankle joint. An ankle joint at the level of the anatomic ankle joint is used only in children where the shoe has a heel so flat that it cannot accommodate the round channel and point. We believe that all routine long leg braces should be made so that shoes can be easily removed from the brace. This permits not only the use of several pairs of shoes as desired, but also permits the patient to have channels placed in new shoes without the necessity of going without his brace while a new shoe is being fixed to the brace. This is of obvious advantage to the patient who lives some distance from the brace shop.
7. Anterior stops to limit the degree of dorsiflexion should be avoided if possible. Anterior stops definitely interfere with function. Getting into and out of a sitting position, and walking with hips properly "under" are examples of activities hindered by anterior stops. They also tend to break the shoe at its shank and cause pivoting on the heel when walking. If dorsiflexion is to be limited it can usually be done by a carefully fitted high top shoe laced snugly, or by a posterior elastic strap from the calf band to the heel of the shoe.
8. The distal end of the lateral upright of the brace below the knee should be longer than the medial. In the adult, this should be approximately 3/16 inch and in the child approximately ⅛ inch. The function of the longer lateral upright below the knee is to shift the entire brace medially at its top and thus enable the patient to "get over" his hip easier.
9. Roof wedges are used to position the shoe—and thus the foot in the shoe—within the over-all alinement of the brace below the knee. A roof wedge is placed between the channel of the ankle joint and the upright of the shoe at its heel. A lateral upright is used routinely to make up for the longer lateral-point length. If a position of varus is desirable, no lateral roof wedge should be used. If valgus is desirable, the height of the lateral roof wedge can be increased. If an exaggerated varus position is desirable, a medial roof wedge may be used.
10. Leather cuffs and knee pads crossing the anterior portion of the extremity should be kept at a minimum. Usually a strap 2 inches wide across the top of the brace will secure the brace at this level. There is usually no need for cuffs at mid-thigh and calf. A knee pad made as small and comfortable as possible will complete the support of the brace.
11. The appearance of a brace is important, particularly if it must be worn by a patient for a long period of time. For this reason, the metal should be polished and the leather should be of superior quality. The leather covering the bands may be of contrasting color if the patient so desires.
12. When at all possible the long leg brace

should not be attached to a pelvic band or to a back brace. Dr. Michael Hoke has been credited with saying, that if a patient can be taught to walk safely and practically with a long leg brace and a pelvic band, he can do better without the pelvic band. The pelvic band definitely interferes with function in most cases, and may promote the development of flexion-abduction contractures in the growing child. While this attachment may be necessary to prevent rotation of the hip, prevent jackknifing of the patient, and give lateral stability of the patient, it is rarely necessary if good mobility into extension and adduction of the hip has been maintained.

FOREARM AND HAND ORTHETICS

Indications

1. Support and aline forearm, wrist, fingers and thumb in functional position.
2. Add dynamic movement to forearm, wrist, fingers and thumb.
3. Adapt hand to hold appliances.
4. Adapt appliances to functional hand use.

The hand splint.—The hand splint and its attachments have little uniformity of design throughout the world. There are at least two reasons for these variations in design. First, the forearm, wrist, and hand, as a unit, are required to function in multiple and, at times, highly complex patterns of movement and no one apparatus is likely to satisfy all these demands. Second, hand splints designed to increase functional capacity have been used widely only during the past 15 years due particularly to the demands of poliomyelitis, peripheral nerve injuries, traumatic quadriplegia, and cerebral vascular accidents.

The basic hand splint used at Warm Springs is the so-called "opponens splint with wrist extension," even when the characteristic thumb and C-bars may be needed only to properly position and stabilize the splint on the hand and forearm. This basic splint is applied to the dorsum of the hand and forearm to give the fingers and thumb greater freedom and to permit easy attachment of assistive and adaptive devices. We must admit that it is still far from being an ideal functional orthesis.

Points of emphasis

1. The distal crossbar at its ulnar end must be fitted snugly around the fifth metacarpal and, when necessary, extend into the palm of the hand to support the metacarpal arch.
2. The distal crossbar at its radial end must be fitted to hold the first metacarpal joint in a position of functional opposition by pressing against the distal end of this metacarpal.
3. The C-bar must abduct the thumb as widely as is functionally practical. It should be rounded to press under the head of the second metatarsal without limiting the flexion of the index finger, and fitted snugly in the web of the thumb and extend along the full length of the proximal phalanx of the thumb to control the lateral alinement of the first metacarpophalangeal joint, but not limit flexion of the interphalangeal joint of the thumb.
4. The middle crossbar should be angled backward and not come off at right angles to the center bar, so that its strap will pass downward and backward, and then around the wrist just proximal to the thenar and hypothenar prominences. This will prevent the splint from sliding distally and the C-bar will prevent it from sliding proximally.
5. To minimize pressure at the dorsum of the wrist and around the forearm, the central bar should extend proximally as far as possible without interfering with supination and pronation and, of course, without limiting flexion of the elbow.
6. First dorsal interosseus assistance is most easily obtained by a ring around the proximal phalanx of the index finger attached to an elastic band or a spring, which is attached to a metal outrigger; the outrigger, in turn, is attached to the radial aspect of the distal crossbar. The outrigger can be made detachable by a simple keyhole and screwhead joint. The second metacarpophalangeal joint should be positioned in abduction and 15 degrees flexion. The pull should be at a right angle to the proximal phalanx. The distance between the attachment of the elastic to the outrigger and the ring should be equal to the length of the index finger. If the outrigger and elastic interferes with necessary function, they can be replaced by a length of spring wire running forward from the crossbar or may be replaced by attaching the elastic to the center bar and running it over a small pulley placed lateral to the proximal phalanx of the index finger. These last two methods are more difficult to construct and to adjust, and have less positive action.
7. Finger and thumb extension assistance can also be obtained by elastic bands or springs

fastened to the rings and outriggers. Three points of fitting must be kept in mind: (a) Direction of pull must abduct the fingers and thumb as they extend and permit flexion of the fingers toward the base of the thumb; (b) In the design for extension assistance, a clear distinction must be made between assistance to the extrinsic extensors and to the intrinsic extensors of the fingers. When extrinsic extensor weakness exists, the rings should be passed around the proximal phalanges of the fingers; when intrinsic weakness is present the ring should be placed around the middle or, in unusual cases, the distal phalanges of the fingers. When intrinsic weakness exists a lumbricales bar is also necessary to depress the metacarpophlangeal joints; (c) the direction of pull should be at a right angle to the phalanges being assisted when the hand is in a functional position. This means that the outrigger that assists intrinsic extension must be placed considerably farther forward than an outrigger that is designed to assist extrinsic extension.

8. Flexion assistance is difficult to obtain in a really practical manner. Unfortunately, any device designed to pull the fingers into flexion must occupy a position in the palm of the hand and limit functional use. Spring wire or strips of spring metal can be used to press the fingers into flexion. These wires are attached to the distal crossbar of the hand splint and to rings passed around the necessary phalanges of the fingers. These require considerable adjustment and are not as practical as they should be.
9. Countless objects that are normally held in the hand may be attached to the hand splint. The most common method of attaching these objects to the hand splint is through a simple sleeve that may be slipped over the end of a T bar. This T bar is attached to the distal crossbar of the splint, runs forward over the dorsum of the hand, and curves around the fifth metacarpal to pass under the hand just behind the metacarpal phalangeal joints. An extension to this T bar may be necessary to hold the fingers away from the object attached to the hand splint. The following is a representative list of some of the more commonly used objects that are attached to the hand splint in this manner: (a) swivel spoon, (b) swivel "spork," (c) swivel cigarette holder, (d) pen, pencil, and paint brush holder, (e) lipstick holder, (f) page turner, and (g) toothbrush holder.

   If the hand is capable of holding these objects without the need for a hand splint, they can be attached directly to the hand or fitted to weakened or distorted fingers. The object can be held in the required position by modifying the size of the handles or by adding rings fitted over one or several fingers. The precise design will depend on the strength and balance of the particular hand.
10. The fingers and thumb may occasionally be given dynamic movement through a harness and cable arrangement similar to that used in prosthetic devices for the forearm and hand. These require some stability of the trunk and in the shoulder and arm of the side that is weakened. They are usually powered by movement of the opposite shoulder. A number of these devices have been made at Warm Springs but, in general, they have only limited use.
11. Electronic devices to add dynamic power to the hand have not been found practical at Warm Springs. These are intricate in design, difficult and expensive to build, and very difficult to maintain in practical working order. At the present time, we have not been able to build these devices to satisfy the previously mentioned criteria for functional orthetics.

SHOULDER AND ELBOW ORTHETIC DEVICES

Indications

1. Support arm and forearm in a position of effective hand use.
2. Add dynamic movement of hand towards head (elbow flexion and supination) and hand reaching outward (shoulder forward flexion and adduction and elbow flexion).

"Overhead slings," "feeders," and "reachers" are the basic devices used to achieve the objectives in the above indications. The designs for overhead slings and feeders have been described in detail elsewhere and will be discussed only in brief outline at this time.

A. *Overhead slings.*—An overhead sling is used to position the shoulder girdle and arm through support of the elbow and forearm within a range of protected function. It is a device most commonly used during recovery from weakness but may be used in a more chronic phase, particularly in children, for functional positioning of the forearm and hand.

Points of emphasis

1. The overhead rod should be as high as is practical. The higher the rod, the flatter will be the arc of movement of the hand and forearm. This is most important and cannot be emphasized too strongly.
2. When used for support of the shoulder the arm should be held at an angle of 70 to 80 degrees midway between forward flexion and abduction.
3. When deltoid and short rotator strength ranges between "zero" and "poor," the elbow should be supported approximately ½ inch to ¾ inch above the working surface of the bench, table, or lapboard. The hand should rest on the table or just swing free, depending on the desired function of the hand and the strength in the external rotators of the arm and shoulder. When strength is "poor plus" to "fair," the elbow, forearm, and hand should be resting lightly on the table so that the voluntary muscle power of the shoulder girdle, plus the upward lift of the spring, permits the forearm and hand to be lifted free and moved about easily.

B. *Feeders.*—The term "feeder" is used to designate all types of apparatus designed to bring the hand toward the head by means of a "see-saw" device under the forearm and/or elbow. The design of the feeder also permits horizontal movements. In general, a feeder is not used until time and adequate treatment indicate that the patient has little chance of recovering functional use of his upper extremities through voluntary muscle power; however, a feeder may be used as part of a convalescent program to provide strength through repetition of movements against graded stress.

The forearm cradle may be supported in four different ways:

1. By an overhead bar. The single cage and cradle replace the usual double cuffs of the standard overhead sling. This is a "suspension feeder." It gives greatest assistance of any type of feeder in all ranges of motion and it is relatively simple to set up and adjust. The motion imparted to the feeder by the overhead rod and spring may be too free for stable activity by some patients. The overhead bars, suspension spring and strap are conspicuous and rather bulky to add to a wheel chair.
2. By a metal stand placed on the work table. This is a "stand feeder." It has the advantage of being portable, is the least conspicuous of feeders and is easily moved about on the table surface for greater usefulness. However, it may tip easily and is usually too high for children to use.
3. By a clamping device attached to table, bench, lapboard, chair arm, or chair back. This is a "clamp feeder." This feeder has the advantage of being quite stable, can be made small and compact, and is less conspicuous than the other type of feeders. It has the relative disadvantage of requiring somewhat greater muscle power and control than a suspension type feeder, and its range of motion may be limited.
4. By a metal bar attached to a corset, back brace, or belt. This is a "body type feeder." It has obvious value to the patient with severe weakness in the upper extremities but with adequate strength in his trunk and lower extremities to sit down, stand up, and move about in a safe and practical manner. It can be made so that it is quite comfortable particularly when attached to a corset, and can be worn inconspicuously under normal clothes. Because of the weight of the apparatus plus the weight of the upper extremities, it has the disadvantage of causing some postural strain. It must be carefully applied and constantly checked when applied to a growing youngster—particularly when used unilaterally.

Points of emphasis

1. Feeders are not intricate in design but they are difficult to fit and adjust for maximum usefulness. No physician can prescribe and no orthotist can construct a feeder that can be used with maximum usefulness without preliminary trial. It is the responsibility of the physician and the therapist working together to determine by trial and error the exact combination of feeder components (type and size of cradle, position of channel, height of cradle, need for supinator attachment, length, number, curve, and range of motion of swivel arms) before the prescription to the orthotist is written. This means that the use of feeders must not be attempted unless sufficient variety of these components are available for trial-and-error preliminary fitting and use. It is important to emphasize that the orthotist must not be expected to do this.
2. No feeder devices should be ordered until proven useful in practical activities and thoroughly accepted by the patient. Such

devices are not only expensive but are conspicuous and, for the latter reason, patients may not be willing to use them when they return home, to school, or to a job.

(C) *Reachers.*—Reachers are forearm cradles or elbow supports attached through one or more swivel arms to table or chair to permit an extended range of motion over a working surface. Reachers do not have the see-saw feature of the feeders.

TRUNK ORTHETIC DEVICES

Indications

1. Support and aline spine to permit safe activity without distortion of spine.
2. Stabilize trunk to permit activity of upper and lower extremities.

Corset.—At Warm Springs the corset is the basic device used to support, aline, and stabilize the trunk. The corset is used in the place of a back brace because we feel that it is more functional. (1) It will give comfortable support; (2) it is easily modified; (3) it is relatively inexpensive; (4) it is acceptable to patients; (5) all attachments discussed below can be added with relatively little difficulty.

Points of emphasis

1. We have yet to find a corset so designed that it will fit well in both the sitting and standing positions.
2. The corset should be of correct height. In the back it should just touch the surface on which the patient is sitting and extend upward to a point 1 inch below the inferior spinal angles of the scapulae. In the front it should extend from the pelvic brim to the xiphomanubrial junction. If it is too short in front, the top slips under the inferior costal margins and is uncomfortable. If it is too high, it limits chest expansion.
3. For female patients a skirt is usually added. This provides greater stability to the trunk and permits the attachment of garters. This skirt is, unfortunately, difficult to fit comfortably.

Attachments

1. *Horizontal bars.*—An aluminum bar may be fastened across the top and bottom of the medial stays in the back of the corset. This may be called "standard equipment" on all corsets made at Warm Springs. This provides far greater stability than the stays alone and converts the corset into a true back brace. Even greater rigidity can be obtained by reinforcing the medial stays with molded aluminum strips. (Figs. 1 and 2)

Figure 1. Top of corset is shifted off to right and held in this position by aluminum bars riveted to corset stays.

2. *Shifted top.*—If the aluminum bars are attached across the top and bottom of each stay with a single rivet, the top of the corset can be shifted to the right or left to provide a corrective force against certain types of dorsolumbar lateral deviations of the spine. The corset can be held in this corrected position by additional rivets.
3. *Simple crutches.*—Simple crutches are similar in design to the "cow horn" feature of some back braces. These simple crutches are attached to aluminum bars at the top of the corset and are intended to hold the shoulders back in position and thus support the middle and upper back. Simple crutches are seldom used to support the shoulder in an elevated position. If such

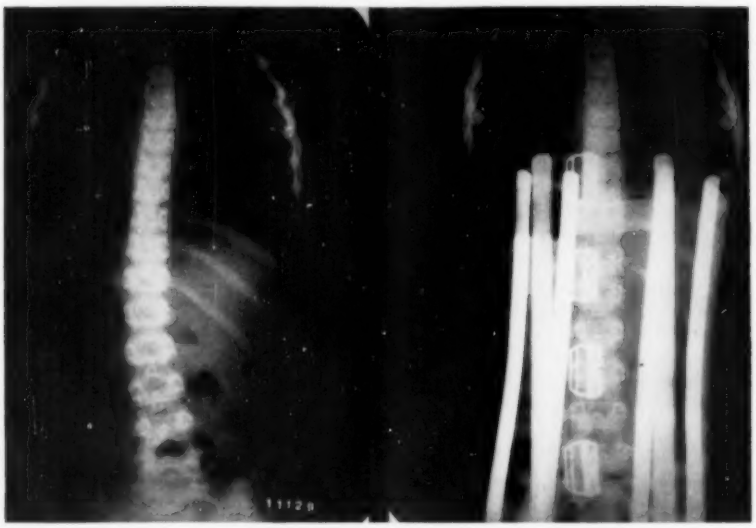

Figure 2. X ray of patient with left high lumbar curve before (left) and after fitting with corset seen in figure 1.

support to the shoulder is necessary, the crutch should be heavily padded and carefully used. These simple crutches can be made detachable by fitting them into sleeves of metal attached to the aluminum bar across the top of the stays at the back of the corset. It may be advisable to have these crutches detachable so they can be removed if, when the patient is walking, they interfere with the top of the hand crutch.

4. *Quadrilateral crutch and pressure pad attachment.*—A quadrilateral crutch is a molded kidney-shaped pad fitted to the anterolateral aspect of the upper thorax to press against the base of a dorsal curve. It is attached in the same manner as a simple crutch. It is opposed by a kidney-shaped leather pad in the inside of the corset on the opposite side of the thorax placed just below and posterolateral to the apex of the dorsal curve. These pads are placed to oppose each other in force and thus correct the dorsal curve. They are attached to each other by straps that go around the thorax anteriorly and posteriorly, running from the top of the quadrilateral crutch down to the sides of the pressure pad. The quadrilateral crutch is hinged at its base so that tightening of the strap causes pressure to be exerted against the upper thorax. A simple crutch is usually attached to the corset on the opposite side to the quadrilateral crutch so that rotation of the thorax away from the pressure of the quadrilateral crutch is not permitted.

5. *Head traction.*—Pressure upward against the occiput and mandible may be obtained by this attachment. This may be used not only in the attempt to straighten lateral deviations of the spine but also to hold the head in position when the anterolateral or posterior cervical muscles are weakened. A vertical sleeve of metal is attached to the back of the corset between the medial stays. A bar of metal supporting the head piece slides within this sleeve. (Fig. 3)

Points of emphasis

1. It must be remembered that the force pressing upward against the head must be counteracted by equal force pressing downward against the hips. The corset must be so fitted that it cannot slide downward as the pressure is increased against the head piece. This can be accomplished by applying straps from the posterior stays of the corset to run downward and laterally above

the crest of the ilia to the anterior stays at the front of the corset. The straps must be made adjustable to fit snugly about the waist.

2. The traction attachment must be made as simple to apply as is possible. This is most easily obtained by fitting the sleeve with a spring clip which controls the height of the traction bar by slipping into notches in the traction bar.
3. Head flexion, extension, and rotation should be permitted by use of swivels in the yoke supporting the mandibular and occipital pieces.
4. The occipital piece should be horizontally swiveled. This swivel should be attached to the occipital piece at the junction of the middle and lower third of the occipital piece. This forces the occipital piece into a more horizontal position as traction is applied and tends to lift the head upward rather than push the head forward against the chin piece.

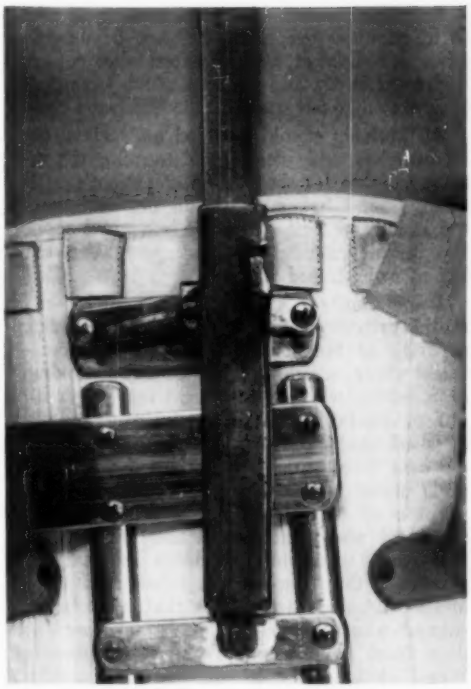

Figure 3. Notched head traction rod held in sleeve of corset attachment. Spring steel bar on sleeve fits into notches. Also shown is the horizontal tract that permits shifting the corset within the line of traction.

MISCELLANEOUS ORTHETIC DEVICES FOR FUNCTION

Hand crutches.—The so-called "Everett" crutch is the most commonly used hand crutch at Warm Springs. This is simply an aluminum modification of the Canadian crutch. These crutches permit placement of the arm, forearm, and hand within the crutch itself and are used to teach the patient to stand in a normal position rather than leaning forward, hanging on the axillary top of the usual crutch. The forearm band prevents flexion of the elbow and takes the strain from the triceps. This was originally intended as a training crutch to promote an upright position with the least amount of effort but, because most patients tend to prefer the crutches they used when originally taught, most of our patients prefer the Everett type crutch for daily activity in the chronic phase of their disability.

Points of emphasis

1. The top band of the Everett crutch should press the arm at the level of the junction of the middle and upper third of the arm.
2. The length of the crutch below the hand piece should be just sufficient to permit the patient to hike his lower extremity up from the floor without leaning forward. If the Everett crutch is too long below the hand piece it takes away most of the advantage of this design.
3. An axillary top can easily be placed on the uprights of the Everett crutch to replace the arm band. Many patients may begin standing with this axillary top for support and then later replace it with the usual arm band.
4. If arm strength, particularly triceps strength, returns and good trunk and hip stability is present, the Everett crutches can be cut down to cane height. This means that the upright above the forearm band is removed. The forearm band can be the usual three-quarter-closed band or can be a complete circle. This circle can be so attached to the uprights that it will swivel and patients can lean on this cane with the elbow bent and the forearm pressing into the padded ring for support. This swivel top will also permit the patient to flex the elbow without losing the cane.

Lofstrand crutch.—The Lofstrand type crutch is in common usage. It will not be described here. It is used at Warm Springs when sufficient upper extremity and trunk strength permits the patient to take advantage of the Lofstrand design.

All patients should be tried on various types of crutches and canes to determine the type most suitable for the particular patient's muscle strength and balance. We do not believe that the Lofstrand type of crutch is a good support for initial training in standing, hiking, shifting of weight, and walking.

Wheel chairs.—A wheel chair may be an essential orthetic device to increase the functional capacity of the severely weakened person. A wheel chair should not be thought of simply as a means whereby a patient may push himself or be pushed from one place to another. A wheel chair, properly designed and fitted, is the base from which the patient can develop a great many physical activities. It is not the purpose of this paper to discuss the relative merits of wheel chairs that may be purchased from the various manufacturers but simply to point out that there are a number of attachments to these wheel chairs that must be considered when a wheel chair is purchased and then fitted to the patient's most effective use. Wheel chairs come in various sizes and, obviously, a chair should be ordered to fit the patient's physical dimensions. Less obvious are the following modifications or attachments that should be emphasized:

1. The most stable portable wheel chair has its large wheels in the back and 8 inch caster wheels in the front.
2. Brakes may be attached to lock the large wheels, permitting the patient to get into and out of the chair with less difficulty and also to keep the chair in position when the patient is working at a table. The 8 inch casters should also have locks that hold the wheels pointing straight ahead to give greater stability for the activities mentioned.
3. Removable desk-type arms with arm rests are most desirable. These permit the wheel chair to be rolled under the average table so that the hands can be placed properly over the table; also removable arms permit the patient to slide from the wheel chair to bed, toilet, or into another chair.
4. Handrims or horizontal spokes may be advisable for propelling the wheel chair.
5. Metal heel clips may be necessary to add to the foot rest to keep the feet from sliding backward off the foot rest.
6. A metal crutch pocket attached to the bottom of the back rest, usually on the right, and a strap at the upper part of the back rest will permit the hand crutches to be held while the wheel chair is being moved about.
7. An attachment to permit narrowing of the wheel chair so that it may be taken through narrow doorways is frequently necessary.

Hoists.—Again there will be no attempt to discuss the relative merits of various hoists obtainable on the market today. It is important to emphasize, however, that no one hoist fills all of the needs of the patient. The hoist that is best to get a patient into and out of an automobile is not necessarily the best hoist for getting a patient into and out of a bathtub, or into and out of bed. The demands of a patient at home and at work will determine the proper type of hoist to be ordered.

CONCLUSION

This discussion has attempted to present the indications and the points of emphasis for the more commonly used orthetic devices to increase the functional capacity of the severely involved patient—not only to make the physical therapist aware of the existence of such devices but also to point out the reasons why the physician orders such devices for his patients. Obviously, an orthetic device is only as valuable as the patient's ability to use it. The responsibility for teaching the patient to use these devices safely and effectively must in large part rest with the physical therapist.

The orthetic devices discussed here are illustrated and described in greater detail in the following papers:

1. Britt, L. P., and Bennett, R. L.: Care of the after-effects of poliomyelitis—forearm and hand. Arch. Phy. Med. XXXI, pp. 646-653, (Oct.) 1950.
2. Bennett, Robert L.: Head traction attached to corset in care of scoliosis. Arch. Phy. Med. XXXII, 84-89, (Feb.) 1951.
3. ——— and Stephens, H. R.: Care of severely paralyzed upper extremities. J.A.M.A. 149: 105-109, (May 10) 1952.
4. Bennett, R. L.: Supportive and Assistive Apparatus in Convalescent Poliomyelitis. Congress of Physical Medicine (1952—Proceedings) pages 93-100—Headlel Bros. Ltd., 109 Kingsway, London WC2, 1952.
5. ———: Classification and treatment of early lateral deviations of spine. Arch. Phy. Med. & Rehab. XXXVI, 9-17, (Jan.) 1955.
6. ——— and Stephens, H. R.: Assistive and adaptive apparatus for upper extremities. Phys. Therap. Rev., 35; 626-640 (Nov.) 1955.
7. ———: Poliomyelitis: Scientific Exhibit (Third International Poliomyelitis Conference) pages 452-470, Philadelphia, J. B. Lippincott Co., 1955.

Orthetics for Function
Part II: Patient Training

Hazel Royall Stephens (U.S.A.)

The term "orthetics" defined and discussed by Dr. Bennett will probably become a pertinent term in the vocabulary of physical therapists. To review the definition, "Orthetics is a medically prescribed device applied to or around a weakened bodily segment to give support and increase function." This, please remember, is in contradistinction to the replacement of a missing part through prosthetics. The *prosthesis* replaces and the *orthesis* is an addition—not a replacement. For years a term with this connotation has been conspicuously absent as we have attempted to convey our ideas and experiences on this subject to our colleagues and to our patients. So we are happy to have the terms, orthetics, orthesis, and orthetic devices, to assist us in better understanding each other during the discussion—*Orthetics for Function: Patient Training.*

The responsibility for training the patient should be delegated to the person best qualified—

To know the proper fit of all types of ortheses;
To recognize and safely solve problems that may arise or any modification necessary during the procedures involved in the training program;
To realize the maximum function of the orthesis.

The physical therapist, with her interest and knowledge of kinesiology, functional anatomy, training in muscle reeducation, and psychology of the handicapped, has been the logical person on whom the physician has relied. After the basic patterns for use of the orthesis are established, additional activities are usually added to the orthetic training program by the occupational therapist, recreational therapist, and ultimately the vocational training staff.

The training of patients in the use of their ortheses includes many of the problems encountered in training patients who have prostheses. Permanent loss of muscle power in the bodily segment for which the orthesis is prescribed and/or those segments that can control it, is a usual complication for the person who uses an orthesis. This, of course, adds to the complexity of the training program. The orthetic training program technically includes everything from bilateral feeders to strengthen elbow flexion, a corset to prevent or correct a scoliosis, bilateral braces and crutches for gait training, the use of an opponens splint in preparation for surgery, to functional training in the proper type of portable wheel chair for a housewife, or training a quadriplegia in how to instruct one person to move him with a portable lift. You can readily see that many physical therapy hours must be spent each day in training patients who need one or several ortheses.

In order to plan the training program for any orthesis there are certain natural preliminary steps the physical therapist must understand. The physical therapist must—

I. *Know the patient*—not merely the patient's name, sex, and race, but a thorough knowledge of his medical history including diagnosis, date of onset, previous treatment, and if or how ortheses were previously used. Available records from social service and psychology departments should be reviewed. The physical therapist must obtain and *retain* a joint range evaluation, muscle test, functional test and a record of any sensory changes.

II. *Thoroughly understand the prescription for constructing or purchasing the orthesis.*

III. *Thoroughly understand the prescription for use of the orthesis.*

Why is it indicated and for what purpose? An orthesis may be ordered:

To increase, maintain, or control range of motion,
To support a weakened segment,
To assist in a program of active-assistive muscle reeducation,
To limit activity, and
To increase functional capacity.

These are broad categories. Sometimes such general dispositions are adequate, but if

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Read at the Second Congress of the World Confederation for Physical Therapy, held in New York June 1956. This paper will appear in the published *Proceedings*.

they are not, insist on specificity. You cannot carry out the physician's prescription unless you understand specifically what he desires.

Many ortheses can be made adjustable enough to fit and to be used by several patients of different sizes with different diagnoses and involvement. Every physical therapy department should own adjustable ortheses. They are valuable—

For trial—to determine the type of orthesis best for the patient,

To save time—allowing work with an orthesis while patient's own is being constructed,

In making specific measurements possible on the prescription to the orthotist. (This usually means that fewer adjustments and changes are required after the orthesis is delivered to the patient.)

In cutting down the amount of department equipment.

Adjustable ortheses that have been tried and proven practical for departmental use will be discussed later.

IV. Finally, and most important, the physical therapist *must prepare the patient for the orthesis.* To inform the patient, the physical therapist *must know:*

A. Why it has been ordered—its *purpose* and *value,*

B. How it is to be used—both during treatment and between treatments,

C. How much it is to be used in actual time,

D. What the patient's responsibilities are in regard to the equipment.

If the patient understands *why, when, where* and *how,* you will find him more receptive to the orthesis and more cooperative and conscientious in the use of it. Children as well as adults respond well when they thoroughly understand the purposes and their responsibilities.

Knowing the patient, understanding the prescription for construction of the orthesis, the prescription for its use, and having prepared the patient, the physical therapist is now ready for speedy delivery of the ordered equipment and a prompt medical check so that actual training with the orthesis can begin.

The actual training should be specific and depends on the type and purposes of the orthesis, muscle power and range of motion present, diagnosis, age of the patient, desires of the patient, and the inherent drive or lack of drive on the part of the patient.

BRACES AND CRUTCHES

For specific discussion in training the patient in the orthesis, we will group together the ortheses that are logically used together; i.e., training for the use of the main lower extremity ortheses will include braces, crutches and canes.

You cannot determine the true fit or function of an orthesis until it has been used correctly for a reasonable length of time. The physical therapist must be sure that the patient is comfortable in the sitting position as well as while standing. The calf band must not bind and the knee pads must be adjusted properly. The initial standing of the patient should be considered carefully. Temporary leg supports may be advisable if delivery of a patient's braces is delayed. Ideally, when a patient is ready to begin training in the upright position, he should have his own braces and crutches.

Preparatory Activities

The amount and the type of preparatory activities depend on the purpose of the orthesis. If the equipment is to be used for proprioceptive, psychological, or physiological purposes, the preparation will be less extensive than for the patient who is preparing for as many activities as are possible in a standing position. Careful selection of the activities for each patient in preparation and actual use of braces and crutches is important. Some patients require several activities and other patients only a few. We will discuss those that are basic and have the greatest carry-over value.

The standing table is used as a preparatory step when the physical condition of the patient does not allow standing in braces or when the patient is waiting for braces to be delivered. It provides a progression from a flat position to an upright position as indicated by pulse, breathing, and blood pressure.

Specific stretching of any tight segments that would prevent applying the braces, holding the crutches, or maintaining an upright position in the orthesis must be carried out early.

Sitting balance exercises and activities are helpful in teaching shifting of weight and demonstrate how the head effects balance. These can be taught on the side of the bed, treatment table, wheel chair or mat. Mat activities, wheel chair exercises and functional training technics in the wheel chair can increase balance, trunk and upper extremity strength, mobilization, and endurance.

After the ortheses are received and checked by the physician, the patient may continue some of these preparatory activities as he begins training in his braces and crutches.

Parallel Bars

We believe patients should be introduced to an upright position in the equipment they will be using and not in parallel bars. Parallel bars are valuable to certain patients but the bar work should not precede his experience in standing in his own equipment.

As crutch balancing progresses the parallel bars may be preferred for special work. This procedure helps the patient to realize that his permanent support is crutches, not stable bars, but he also understands that he may need the stability of the bars for the development of certain patterns. Parallel bars may be used most efficiently in conjunction with crutch balancing work. Our professional libraries have many excellent discussions of the use of parallel bars so we will mention them only briefly and emphasize crutch balancing. Parallel bars are not suitable for the standing and walking training of all patients. They are not practical for the patients who lack triceps power or those who cannot lock the elbow. In order to use the bars effectively pressure must be applied through a stable arm to the hand secured on the bar.

Proper crutches can compensate for these limitations, therefore crutches are used for some entire training programs. Parallel bars serve purposes other than specific training for gait and step climbing. Excellent routines for strengthening upper extremities, trunk and increasing endurance are possible in the bars. Some functional training preliminary technics and certain stretching procedures can be carried out well in parallel bars. Parallel bars in a physical therapy department should always be adjustable—preferably in height *and* width. There is one main precaution to be observed in using parallel bars. No habits should be established that would make the use of crutches difficult. Pulling up on the bars is a common example and must be avoided. Pulling up on the bars will provide support but pulling on crutch handles leaves the patient with no support. By using parallel bars in conjunction with crutch balancing these habits are less likely to be established.

Crutch Balancing

Time spent in crutch balancing pays big dividends for the crutch walker. The aim of crutch balancing is to make the patient secure and safe on his crutches—not only for gait training but for all functional activities in the upright position. If the patient is well trained he will listen to and understand instructions, execute them without fear of falling, and not be confused by directions. Thus he will execute his first steps more easily and be encouraged by his achievement.

For the severely handicapped patient the aim may be to obtain enough balance to facilitate being moved from bed to chair, or chair to car, by one person, while the patient is in a standing position.

Getting the patient into the upright position for the first time must be carefully planned. This is an important occasion in his rehabilitation program. He should be shown how the locks on the braces work; he should be taught the difference between the right and left crutch, if there is a difference; and should understand what each piece of equipment is to do for him. Usually two people should assist a beginner in standing until the patient and the physical therapist are confident of safety. Be sure the patient understands what is to be done, what *he* is to do, and what you and your assistant will do. Lifting the severely involved patient to his feet with crutches in place is preferable. This eliminates someone holding him while crutches are positioned and is a smoother operation because he has the support of the crutches immediately. Having the patient wear a substantial belt is a good safety precaution and assists the physical therapist in handling the patient. One hand on the belt and the other at the front of a shoulder are the best points of control for the patient. The following is a simple practical technic for putting a person on his feet: stand in front of him, slide him forward in his chair, lock his braces, apply his crutches, bring head and shoulders forward so they are balanced over his hips. After he is sitting erect, position crutches well in front of and to the side of his feet (so they will not have to be repositioned when he is up), step to the side, take his belt, lift him forward keeping his hips under him, then step behind him as your assistant steps in front of him. Little change should be necessary in positioning of feet or crutches if this technic is carefully executed. The exact reverse of this will put the person back in his chair smoothly and comfortably.

The patient should assume the best posture possible in view of his weakness.

The crutches should be a few inches out and in front of the feet to give stability, but close enough to keep the patient quite erect.

Distribution of weight should be on both feet and on both crutches through hands and shoulders.

Weight should be distributed on the feet, on the heels, and on the forefoot.

For severely involved patients some points in the balancing program may have to be sacrificed until later and, of course, some patients will never be able to maintain balance in a symmetrical way.

In the beginning patients should be cautioned always to keep some weight on the crutches when not moving them. After balance is established the patient should be taught to relax the hand grip to save his hands and to give relaxation between activity. Beginning crutch balance routines should include simple things such as maintaining an acceptable stationary balance with assistance and working toward balance without assistance. The effect the head has on balance should be pointed out early. The patient should be able to tell you that lifting his head causes his hips to be tucked under him and looking down will cause his hips to go out from under him. If he understands which position of the crutches, feet, and the body provides the best balance, he should be able to tell anyone how to position him.

The patient should practice shifting the weight forward and backward from the ankles, keeping his hips under him. The advantages and disadvantages of each position should be pointed out. When more weight is on the forefoot there is more weight on the crutches and the patient feels more stable *but*, because there is so much weight on them, the hands tire quickly in this position. Shifting the weight to the heels takes the pressure off the hands—even to the point that the crutch can be moved and eventually the hand taken out of it—but in the beginning the patient feels much less secure with most of his weight on his heels. Other activities to be learned include:

Shifting weight from one leg and crutch to the other—moving from the ankles.

Moving one crutch only a few inches forward, sideways, back to position and backward. Repeat with opposite crutch.

Turning body slightly with crutches in place.

Tripod position or variation thereof—freeing opposite crutch. Work toward lifting the crutch slightly in all directions and finally over the head.

Maintaining balance with alternate crutch and leg forward, as they are between steps. The patient's crutch and leg are positioned for him. Moving one crutch and the opposite leg backward and returning to position—then the opposite leg.

Lifting both crutches to left, to center, to right, working toward increasing range.

Lifting both crutches together slightly and replacing them.

Lifting both crutches to left—then to right—gradually increasing range.

Removing one crutch: With Everett crutch, release hand, supinate it sharply, grasp the handpiece in this position and turn crutch so that the elbow can be flexed. Pushing down on the handpiece is possible if necessary. Lean crutch on the body—at the front. Replace and repeat on opposite side.

Arm exercises with support of one crutch.

While he is supported by two crutches, teach the patient how to let his hips come out from under him and then tuck them under again.

Use a mirror when advisable.

There is no magic formula that produces good standing balance. It is a result of gradual progression and much work and patience on the part of the patient and the physical therapist. All locomotion activities require balance of one degree or another. If a good extensive program of balancing is included prior to attempts at gait training, the possibilities of walking, or walking well, are greatly increased. Do not rush the balancing program but make it as varied and interesting as possible being sure the patient learns something new each day.

Advanced Crutch Balancing

Advanced crutch balancing is for those patients who have balance for simple gait training but who need additional work in preparation for swing through gait, step climbing, getting in and out of low furniture and picking up objects from the floor. Advanced crutch balancing can include anything that will improve balance or teach the patient how to regain equilibrium when thrown off balance. Some suggested routines:

Balance routine in preparation for swing through gait—lift crutches forward and swing body weight onto them without advancing.

Swing crutches back and shoulders back, keeping hips tucked under at all times.

Teach balancing with little weight on crutches and if advisable without crutches.

Walk crutches out in front—so that hands gradually move toward the floor.

Walk crutches out in front with Everett crutches reversed.

Remove crutch and place on floor from the above position.

While balanced upright, reach with one crutch. Balance to music or counts.

Play games such as "Follow the Leader" and "Simon Says," or ball games, using a large plastic playground ball, hitting it with crutches. Ten pins, propelling ball with crutches, relays, reading paper, lighting cigarette, putting objects in and out of pocket, and certain dressing procedures are useful activities.

A patient should be brought to a standing position for the first time by his own physical therapist, who should also begin crutch balancing routines. When he knows the fundamentals, group clutch balancing classes have advantages. Group work is also excellent for teaching advanced crutch balancing.

Gait training, too, should be initiated by the patient's own physical therapist. Group work may be advisable later. Time does not permit detailed analysis of gait training and step climbing. The physical therapist usually has the responsibility for determining what type of crutches or canes will be most functional for the patient. This is done by careful training with each practical type and evaluating the advantages and disadvantages.

Actual functional training in braces and crutches should follow gait training. Patients should be taught as many ways as possible to do each activity of daily living. They should be taught to execute them in as normal a pattern as possible and with the least amount of energy expended. The ease and grace with which they do these things will minimize their conspicuousness. The training program should prepare them for as much independence as possible in any physical surroundings.

Adaptive equipment available for persons who need braces and crutches are minimal. Ice grippers are available in several styles. Pocketbooks and carrying cases that attach to crutches are practical, and there are canes on the market which incorporate magnets and pick-up devices.

Department Equipment

Adjustable braces have not proven practical as departmental equipment but adjustable crutches and canes are very valuable. They can be made adjustable in length below the handpiece, the handpiece may be lowered or raised, and the top of the crutch can be interchangeable from Everett to axillary.

The patient's own crutches can be temporarily lengthened by metal clips that hold a series of hard rubber disks. The number of disks determines the additional length.

Corsets

Training in the use of the corset should not be taken lightly. It is most important to convince the patient of the value of the corset to him, and even of the danger sometimes involved if it is not worn. The corset must be checked for the patient's comfort, restriction of breathing or swallowing, and must be padded or adjusted until it is satisfactory. Crutch attachments or a pressure pad should serve the purpose intended and still be comfortable enough to wear. The patient should be taught how the corset is to be applied and how to do it himself when advisable. The corset is always put on in a lying position so that it will fit down over the hips, will be reasonably snug at the waist, and loose enough not to constrict breathing at the rib cage.

Corset With Head Traction

The actual application of a corset with head traction is important. Each time the corset is put on the child, the following steps should be followed in the order listed:

1. Release traction bar between headpiece and corset by pulling out the clip which is attached to metal sleeve on the back of the corset.
2. *Always release traction* first when putting on corset.
3. Put the corset on with the patient in the lying position.
4. Tighten straps at the side of the corset so that they fit snugly around the waist above the pelvis like a belt. *This is most important.* If straps are not tight, the corset will slide down and the spine will not be stretched.
5. Place child in sitting position.
6. Attach headpiece to traction bar.
7. Slide chinpiece into position on rod and tighten screws, being sure the piece at the

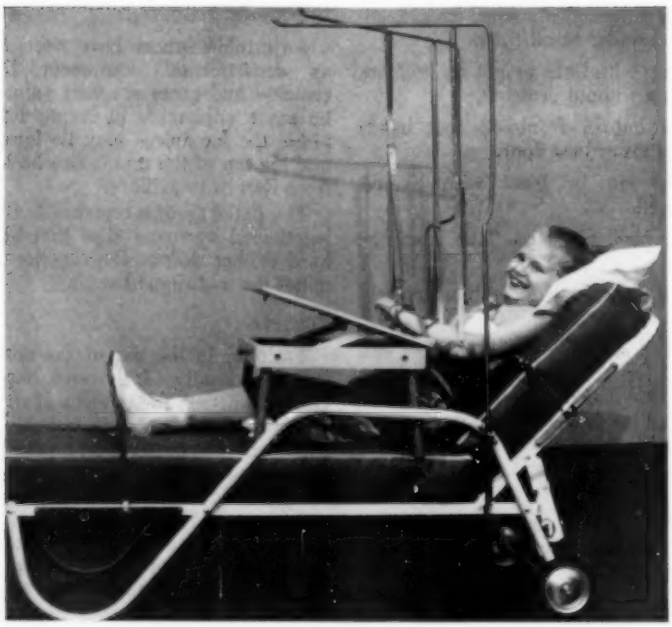

Figure 1. Overhead slings attached to chaise longue with lapboard in position.

back of the head is well under the head and touching the neck.

8. With child's head in an erect position, pull up on traction bar until headpiece is pressing firmly upward against chin and head.
9. Test to see if correct amount of traction is applied by trying to lift child's head out of headpiece. No additional stretch should be possible if traction is correct.
10. Check traction in 5 to 10 minutes after corset has become adjusted and apply more traction if possible. This is important.

The amount of pressure should be as much as the child can tolerate, and the corset should be worn as many hours each day as possible and at night if ordered. Clean track with oiled cloth each time corset is washed.

HANDSPLINTS

In addition to being sure that the handsplint fits and performs the purpose for which it was intended, the physical therapist must be responsible for the fit of the splint during activity. An orthesis may look and feel fine until it is in use—then it may cause irritation, stop circulation, cause substitute patterns of motion, and even interfere with function. It is more important to keep a close check on handsplints than any other orthesis.

A handsplint is usually prescribed for full time use, and incoordinate patterns which are not recognized early could jeopardize ultimate recovery and coordinate function. The use of the hands in the handsplints must be thoroughly understood by the patient and checked by the physical therapist. If the rubber bands or hat cord has lost its effectiveness it should be replaced. The physical therapist working with the patient in and out of his handsplint must interpret whether it is functional or not, and should be able to give the physician suggestions for making it more functional. When the patient is concentrating on complete function there may be additional changes needed; for example, pulley extension assistance to eliminate the out-rigger apparatus when finger extensor power needs to be compensated; or unlined splints for a housewife so the hands can be used in water. Handsplints require more constant checking and evaluation than any other extremity orthesis.

OVERHEAD SUSPENSION SLING

Overhead suspension slings are probably the most universally used ortheses for the shoulder girdle. Primarily a treatment orthesis, unilateral or bilateral slings may be attached to a bed, wheel chair, chaise longue, (Fig. 1), regular chair, child's high chair, and on an overhead track for walking patients (Fig. 2). They should always be used with a table adjusted in height for the prescribed exercise and activity. They can be used with bed table, adjustable bed board, adjustable lapboard on wheel chair, table, desk and regular counter space for walking patients. Overhead slings have manifold purposes:

1. To support the weakened shoulder girdle so it may be brought to a functional position without the weight of the arm, forearm, and hand.
2. To serve as a part of an active-assistive muscle reeducation program for upper extremities, particularly the shoulder.
3. To safely support the shoulder and make possible certain strengthening activities for forearm and hand during early convalescent care.
4. To permit preparatory exercises for suspension feeders.
5. To promote ease of breathing in a sitting position for patients with respiratory involvement.
6. To assist the very severely involved patient in maintaining comfortable sitting balance.

The adjustment of the slings is the basic part of patient training. Adjustments:

1. Overhead bar, number and tension of springs provide correct support. The changing tension in springs tends to stimulate the flexion and extension reflexes of shoulder and arm, assisting in increasing muscle tone.
2. Overhead bar should extend at least 2 feet above the shoulder.
3. Tightness will limit degree of flexion and abduction possible: 70-80 degree of flexion and abduction is desired. The lapboard should be almost axillary height.
4. For deltoids graded O, TR, P−, or P, elbow should be ½ inch to ¾ inch above lapboard or work surface.
5. For deltoids P+, F−, or F or better, the elbow should just touch lapboard.
6. Cuffs for wrist or clips for handsplint are adjusted so that the hand can be used on or rested comfortably on the table or lapboard.

Figure 2. Overhead track provides support while patient stands.

7. If imbalance favors a serratus anterior on one side and the deltoid on the other side, the lapboard is high on the side of the weaker deltoid and low on the side of weak serratus. On the low side it merely supports the elbow—no overhead sling is used. A leather strap is attached above the elbow to serve as a reminder not to bring the elbow away from the side.

Be sure the patient thoroughly understands the purpose and principles of the slings and how they should be adjusted. Remember he will eventually spend much time in this equipment without supervision, and it will provide safe activity only if correctly adjusted and used.

Exercises

Slings are usually used in conjunction with several periods of specific active-assistive muscle reeducation. Teach the person to get assistance

from the rod and spring and *never* to pull down on them.

1. Forward flexion is best accomplished by positioning the spring forward on the rod. The patient lifts the elbow, then relaxes.
2. Abduction is best accomplished with the spring just slightly forward of the shoulder. Patient lifts elbow up from the side, then relaxes.
3. To encourage biceps motion the spring should be slightly back and rod should be angled in toward patient. Patient bends the elbow swinging the hand in toward the body, then relaxes.
4. To encourage triceps motion, the spring should be slightly forward and the rod angled slightly out, away from the patient. Elbow is bent at right angle. Patient straightens elbow—swinging hand out from body, then relaxes.
5. Horizontal abduction and adduction may be done with elbow bent or fairly straight.
6. Patient should understand thoroughly which routines apply to him.
7. Do not allow the patient to do his exercises in slings without supervision until you are confident he does them correctly.
8. Check exercises often to be sure of correct adjustment and coordination.
9. Teach patient recreational activities he can safely do in slings. These should be introduced only after the patient knows his exercises and assumes his responsibility for them.
10. Sometimes certain functional activities such as eating, shaving, and handling mail are allowed as additional exercises.
11. Occupational therapy is usually ordered as soon as coordinated exercise patterns are established.
12. In a combined program of specific muscle reeducation and beginning functional activities the patient may use a high lapboard most of the day and a lower lapboard for more normal position for his prescribed functional activities.
13. Patient continues to use slings and sling routines until strength and coordination return, until replaced by another type of orthesis, or until discontinued by the physician.

Adjustable double lapboards and tables, and removable clamps are advisable for a physical therapy department. Adult double lapboards for portable chairs should range between 6 inches and 11 inches in height—for wooden chairs the range must be higher. Tables for functional work should be 30 inches high. This is standard table height.

FEEDERS

Feeders are the ortheses responsible for most of the function possible for many severely involved upper extremity patients. In 1955 we had 120 patients using feeders at Warm Springs.

The suspension type of feeder was an outgrowth of the overhead sling. This feeder has been in use at Warm Springs for about 13 years. We believe the suspension feeder is valuable primarily for stimulating and increasing muscle power, as a functional orthesis for children and as a training orthesis for patients who need it in preparation for a more functional type of feeder.

The feeder is usually suspended from a metal rod as is the overhead sling. This rod may be clamped on the back of a wooden wheel chair, portable wheel chair, regular chair, baby's high chair, to a bed, a desk, or table. It has been used on a chaise lounge to allow activity in a semi-reclining position. Details on the parts of the feeder have been discussed in another paper. In the suspension feeder the overhead rod must provide the support and some of the flexibility needed. Abducting the rod may increase horizontal abduction and elbow extension. Adducting it may increase horizontal adduction and elbow flexion. Either of these adjustments may accurately position the hand or utensil. The patient's first treatment in the use of feeders should be a satisfying experience. In order to insure this all the points of adjustment must be considered.

The tension and number of springs or rubber bands needed depends on the weight of the extremity and amount of muscle power present. Sometimes the spring is eliminated and the strap is suspended directly from the rod. This gives less assistance and more stability. The position of the spring on the rod is an important adjustment. When it is placed forward it assists extension of the elbow, and when it is placed backward it assists flexion of the elbow. The position of the spring on the rod may be the easiest place to begin adjustment.

The suspension feeder gives the greatest as-

sistance of any feeder in all ranges of motion and is the easiest to set up and to adjust. The disadvantages are obvious. The overhead apparatus is conspicuous, must be removed when putting the chair in a car, and the motion may be too free for some patients.

Ball-Bearing Round Clamp

The ball-bearing round clamp feeder was designed primarily for a wheel chair in order to eliminate the overhead bars, to be more portable, and less conspicuous. The disadvantages are that it is more complicated to adjust, and more equipment is required to determine if a patient can use it. Today it is the most practical and the most popular feeder for a patient confined to a wheel chair.

A ball-bearing cylinder attached to a round clamp is angled permanently at the proper position on the portable chair. Swivel arms are the connections between the base and the forearm support. Usually there are two and they are described according to their proximity to the base. The length and adjustment of these arms are determined by "trial and error." The first swivel arm is $\frac{3}{8}$ inch in diameter, usually has three 90 degree bends to allow a $2\frac{1}{2}$ inch drop which facilitates elbow clearance when the hand is up. Eight or nine inches is an average length for an adult or child's first swivel arm. The second swivel arm can be $\frac{1}{4}$ inch diameter provided the arm is not too long or heavy. It may or may not have three 90 degree angle bends with a 1 inch drop. The tubing on the distal end is the proper height to allow the hand to reach the head and the elbow to clear the swivel arm. The average length of the second swivel arm is 6 to 7 inches with tubing at the distal end 2 to 3 inches high. Heavy, long arms may require material $\frac{3}{8}$ inch in diameter and the length is usually 9 inches. They are usually made to curve away from the body. When a $\frac{1}{4}$ inch curved second arm is used the average length is 6 to 7 inches. The forearm support for this type of orthesis may be a cradle, flying saucer, or a combination support.

To determine if a patient needs a ball-bearing round clamp feeder the physical therapy department needs a first swivel arm adjustable from 7 to 10 inches in length. One or two $\frac{1}{4}$ inch thumb screws are necessary to keep the inner rod from turning — the rod is ground down on one side to give a flat surface on which the thumb screw tightens. Adjustable swivel arms are used only for trial. Two second swivel arms with a 1 inch drop and two curved are needed. They should be 6 and 7 inches in length with 1 to 2 inch tubing on the distal end. Additional adjustments in height can be controlled by a height adjustment collar — a sleeve of monel metal held on the post by an Allen head screw. For heavy, long arms a 9-inch curved second swivel arm is usually satisfactory.

Adjustable Ball-bearing C-Clamp

The adjustable ball-bearing C-clamp is merely a C-clamp with a ball-bearing cylinder attached to it in such a way that the cylinder can be tipped in various directions. It is designed to be clamped to the edge of a table or desk or the arm of a wheel chair or high chair. The clamp is adjustable to fit on any table and to compensate for unlevel floors or table surfaces and variation in heights of chairs. It is comparatively small, more portable than the suspension type, less conspicuous, and easily removed or applied. The first arm of a clamp feeder is $\frac{3}{8}$ inch in diameter, has a right angle bend, and no drop because it is clamped at a lower level than the one clamped to the rear of the wheel chair. The swivel arms for the clamp feeder are not as long as other types because the base is attached forward of the body. A first arm 5 or 6 inches in length usually gives smooth operation since length is not needed for range of motion. The second swivel arm is $\frac{1}{4}$ inch in diameter with one 90 degree bend and an average length for either children or adults is 6 inches. The forearm support may be a cradle, a combination or a cuff.

As standard equipment in a physical therapy department adjustable first swivel arms for this type feeder should have one 90 degree bend, no drop, and be adjustable 4 to 6 inches in length. Three second swivel arms are needed for trial in the department. They too, should have one 90 degree bend. They should be 5, 6, and 7 inches in length with tubing only $\frac{3}{4}$ inch in height at distal end. Not more than $\frac{1}{2}$ inch should extend above the second swivel arm to keep the patient's hand closer to the working surface.

Body Type Attached to Corset

Some patients have adequate strength in trunk and lower extremities for standing up, sitting down and moving about safely and practically, but have severe weakness in the upper extremities. None of the feeders described so far are practical for these patients. Therefore, it has been necessary to design special feeders. The most practical is the corset type. We have 23 patients using this type of feeder.

The feeder is attached directly to a well-fitted corset. This feeder supports the forearms and hands in a functional position whether the patient is sitting or standing. Another advantage is that it can be worn inconspicuously under normal clothes. Simple button-hole openings permit easy access to the ball bearings and two-piece garments need no button holes.

Vertical aluminum bars are attached to the medial stays and horizontal bars are attached to the four stays. A flat metal channel is attached horizonally to the vertical bars. The placement of the bar depends on the length of the patient's trunk and the length of his arms. Allen set screws are used at each end of the channel to secure the stationary arm. The stationary arm is a flat stainless steel rod curved to the contour of the body. It fits into the horizontal flat channel and usually extends slightly ahead of the shoulder at a midline of the body.

All swivel arms for corset feeders have been ¼ inch in diameter. The first swivel arm is straight and fits into the ball bearing of the stationary arm. The length of these arms is determined by actually trying them.

The average length of the first swivel arm for children is about 3 inches and for adults it is about 3¾ inches. The second swivel arm usually has a 1 inch drop and also a taller tubing cylinder on the end that accommodates the cradle post. This aids in clearing the elbow when the hand is up. It is necessary because the base of this feeder is relatively higher on the body than the other types. The average length of the second swivel arm for children is 6 inches with 3 inch tubing and for adults 7 inches with 3½ inch tubing. A cradle is usually used for forearm support.

Corset type feeder equipment for a department must include: a child's corset and an adult size corset—each as adjustable as possible in width and equipped with the channel. A 4¼ inch stationary arm is needed for children and a 6½ inch arm for adults. Two first swivel arms are needed —child's adjustable from 3 to 4 inches, adults adjustable from 4 to 6 inches. Two second swivel arms are needed—one 6 inches with tubing 3 inches in height and one 7 inches with tubing 3½ inches in height. Height adjustment collars will help in determining the correct height.

Adjusting Feeders

The criteria for adjusting feeders depends on the purpose. If the purpose is to increase elbow flexion power, the feeder is adjusted to give those muscles an opportunity to work through the desired range. If the purpose is to increase functional capacity, it is adjusted to obtain all function possible—in patterns as nearly normal as possible with the existing weakness.

To be considered first is the patient's position in his chair. He must be comfortable and he should have enough back support to sit in a comfortable upright position. The support should not limit lateral motion of the shoulders or trunk. Slumping into a sagging back support limits substitute patterns of motion that assist in feeder management. A posture panel is a good support for portable chairs and is available for adult, junior, and tiny tot chairs. A cushion or padded board is sometimes needed to raise a child in his chair so that the elbow clears the lapboard or table as his hand moves to his mouth.

The position of the forearm support is a basic adjustment that can permit easy control of the feeder or no control at all. If it is difficult to get the hand down, move the forearm support forward on the channel or post. This is done by Phillips screws. If the patient has difficulty in getting his hand toward the mouth, move the forearm support backward on the channel or post.

The position of the elbow support must not cause the patient discomfort and must not limit any necessary motion. A different type of elbow support must be tried if necessary motion is limited. Padding the cradle or the dial for comfort and to prevent the arm from slipping may occasionally be necessary. Sponge rubber, adhesive moleskin or felt may be used. Pressure at the point of the elbow is to be avoided and any numbness or tingling should be reported to the physician immediately.

The feeder should be adjusted so as to give the patient the greatest range of motion with the least effort. Angling the ball-bearing cylinder or the first swivel arm downward will assist in lowering the hand to the table. Tipping them upward will help raise the hand to the head or assist in controlling the speed of downward motion. However, it must be remembered that too much angling either way may prohibit the opposite motion. Turning the ball-bearing cylinder in or out may improve the general position of the hand or utensil. The turning can also encourage abduction or adduction and flexion or extension. Raising or lowering the base will change the height of the orthesis and the extremity supported in it.

The swivel arms are points for general and fine adjustment. The first swivel arm can be angled so as to control the position of the second swivel arm horizontally. Usually, for a ball-bearing round clamp feeder, it is advisable to adjust so

that the second swivel arm is on the inside of the first. This allows use of a longer second swivel arm. To accomplish this, the top of the ball-bearing cylinder (on the first swivel arm) is tipped toward the body slightly. Likewise, if the ball-bearing cylinder is tipped away from the body, it assists in keeping the second swivel arm on the outside of the first. This position is often preferable when the feeder is clamped to the arm of a portable chair.

The second swivel arm should be no higher than the cylinder supporting it; the additional height should be obtained at the distal end in order to give adequate elbow clearance. This is accomplished by a higher tubing, height adjustment collar, or tubing height adjuster.

If supination power is absent, a more normal pattern of motion is possible by use of a supinator assistance. Of the following the hat cord and mechanical link are the most functional types.

a. A band of rubber or dental dam from channel or cradle to handsplint is most practical.
b. Handsplint may be fixed rigidly to the cradle.
c. Mechanical link provides supination with elbow flexion and pronation with extension—the cradle actually rotates.
d. Negator spring type is similar to the rubber band type. This spring is used in place of a band of rubber or dental dam.

Pronation assistance may be obtained by the same methods used for supination, but with the force acting in the opposite direction.

Controlling Feeders

Stops are used on any feeder to limit range of motion or to stabilize a joint. They are valuable in early feeder balance exercises and activities. Patients should learn to control feeders in the range that is easy for them. As control improves, the range may be increased by adjusting the stops. Using a stop to *limit* easier motions may assist initiation of the more difficult opposite motions. For example, if lowering the hand is easy for the patient and raising it is difficult or impossible, a stop is used to prevent excessive lowering of the hand and the upward motion may be made possible. Experience brings control and eliminates the necessity for stops in most cases. The type of stop to be used depends on the selected feeder and the specific joint for which control is desired. They are simple to design.

Preliminary Activities

While waiting for feeder equipment to be delivered there are specific preliminary activities to check or teach patients who are to use feeders. These are:

1. Sitting balance and endurance
2. Breathing in the sitting position
3. Swallowing liquids, soft foods, then solids in the sitting position
4. Eating a meal fed in a sitting position
5. Neck exercises
6. Trunk exercises
7. Any specific exercises used in feeder control that are possible without the feeders. Some patients get the feel of these motions better without the equipment.

Feeder Exercises

Be sure that feeders are well fitted and correctly adjusted before attempting to teach feeder exercises. Remember relaxing one motion may initiate another. Specific adjustments can be made so as to control motions and encourage difficult motions.

1. Teach neck exercises in the chair; point out the relationship to the feeder equipment.
2. Trunk exercises are essential and should be done—note the effect each exercise has on the feeder. Taking the patient through a range of motion passively with the orthesis may help to give him the desired pattern.
3. Teach substitute patterns of motion.
   a) Accomplish hand to head motion by:
      (1) depressing shoulder on the side of the feeder
      (2) shifting body weight to the side of the feeder
      (3) rolling the shoulder backward in outward rotation
      (4) lateral trunk bending to the side of the feeder
      (5) tilting and turning the head to side of the feeder
      (6) straightening up or leaning back in the chair
   b) Accomplish the motion of lowering the hand from head to table by:
      (1) elevating shoulder on the side of the feeder
      (2) shifting the body weight to the side opposite the feeder

(3) lateral bending to the side opposite the feeder
(4) rolling shoulders forward with inward rotation
(5) tilting and turning the head to the side opposite the feeder
(6) leaning forward slightly. Gravity assists in lowering the extremity to the table

c) Horizontal motion of the arm is needed for activities such as turning pages, writing, and getting food onto a utensil. Horizontal motion is difficult to accomplish. The person must have enough control of the hand to head motions to keep the extremity level while executing the horizontal motion. Sometimes an anterior stop is necessary to control this.
Substitute patterns that may assist horizontal motions are:
(1) shifting body weight forward or backward
(2) shifting body weight to left or right
(3) twisting trunk to left or right
(4) lifting or lowering the head
(5) turning head to left or right

One or a combination of these motions may be used, whichever is most efficient and requires the least energy. Necessary motions should be practiced with and without the feeder.

4. The patient should be taught to keep the feeder horizontal when it is not in use.
5. Teach exercises unilaterally first. When this is mastered, work on the same exercises bilaterally.
6. Teach control of each arm at feeder level.
7. Teach the patient to stop motions at any point between the lapboard and the head.
8. Start work on horizontal abduction and adduction at a midposition where the feeder is usually balanced. When this is possible, begin horizontal abduction and adduction at various heights between the lapboard and the head.
9. Progress to finer motions of flexion and extension of the elbow at various heights in the horizontal plane. Start at the lapboard level.
10. Feeder exercises done to command or counts and finally to music help to increase proficiency in control of the orthesis.
11. Games provide variation and enjoyment while working on feeder exercises.

Just as soon as control of the feeders is established some prescribed functional activities should be introduced. Eating is usually the activity the patient prefers. Always begin with a food that will be easy to manage and something the person likes. Never attempt a full meal to begin with—wait until feeder control and endurance indicate that the patient is ready. Children's work must be specific exercises but can be accomplished through planned play activities for each motion. Group feeder classes have proven most successful, particularly for teaching functional activities. Classes should be small and have ample supervision.

T BARS

T bars are usually used with feeders. The purpose of T bars is to support weakened hands in position for function and to provide a base for attaching adaptive equipment when grasp is absent. One or two removable T bars can be used according to the length of the hand to be supported and the function desired. Two are usually necessary. Most frequently they are attached to the cradle of the feeder. They are attached to the handsplint when supination of the forearm is present in order to take advantage of this valuable motion.

The distal projection of the T bar is usually the most practical point for attaching functional equipment. It provides a greater range of motion at the table level and also brings the utensil closer to the mouth eliminating the need for extending the length of eating utensil handles.

Equipment for T Bars

A short, flat sleeve of metal that fits the T bar may be soldered to the equipment to be used on the T bar. This provides a secure method of attachment and is removable. Some adaptive equipment is only practical for use on the T bar if it has a swivel attachment to keep the object in one plane as it moves in various directions. Stops may be used to limit the swivel motion or to give the patient something to push against if he has a limited horizontal range. Anterior stops on the cradle may eliminate the necessity for stops on utensils by keeping the arm steady at the correct level. The utensils that need a swivel are sporks (combination spoon and fork), forks, soup spoons, and cigarette holders. Many items can be used practically when attached directly to the sleeve for the T bar. These items include page turners, pencil and pen holders, typing sticks, food

pushers, bun holders, toothbrush holders, lipstick holders, sandwich holders, card holders, dialing sticks, paint brush holders, and small clamps to hold items when the opposite hand can be used. An example of this is a clamp for an embroidery hoop or a clamp to hold the fork while the food is being cut by the opposite hand.

EQUIPMENT ADAPTED FOR WEAKNESS IN GRASP

The amount of function to be derived from feeders is almost proportionate to the amount of power in the hands and the amount of drive the patient has. If the patient has some power in the fingers and hands it is much better to encourage the use of this power, no matter how little it may be, and not use T bars. There are many possibilities for adaptations of routinely used articles which allow limited muscle power to function.

Examples:

Built-up handle for swivel fork, spoon, spork or soup spoon. Built up handles should be made of washable material.

Light metal handles can be made lighter by cutting a series of holes.

Extended handles for regular eating utensils.

Rings on regular eating utensils.

Rings on built-up handles with regular or swivel utensils for eating.

Rings with screw adjustments to hold a regular eating utensil or toothbrush.

Cuffs with a holder for regular eating utensils. Some cuffs fit over the fingers to the palm of the hand, and some fit over two or three fingers so that the extension of the fingers or extension of the wrist can be used to get the utensil to the mouth.

Special equipment for teaching the use of feeders varies with the problem involved. A deep pyrex dish, divided baby dish with hot water compartment to keep food warm, scoop dish, and divided dishes may be used at various stages of training. A food fence that is removable and washable is usually the most practical means of keeping food on the plate and providing a ledge to assist in getting the food onto utensils. Adjustable glass holders for portable chairs have proven to be functional. Flex-Eze straws are excellent for handicapped patients. Extended plastic straws are also available for the more severely handicapped. A simple lazy susan or a ratchet type plate turner is advisable when the patient's horizontal motion is too limited to cover the surface of the plate. This should not be ordered until you are positive that it is needed. The patient may be able to cover only one path on a plate when he begins, but the majority learn to be independent without a plate turner.

Figure 3. Portable frame for Mighty Midget Hoist.

ADAPTED COMMUNICATION ORTHESES

There are numerous ortheses adapted for communication. Writing aids can be attached to the hand or to the handsplint. Circuit breakers, telephone holders and dialing sticks have proven practical for many patients. Special soft lead pencils, ball point pens, built up pens and pencils, clip boards and magnetic boards may prove advantageous for training in writing. Intercommunication systems can be operated by T bars or attachments to them.

Adapted Shavers

Many adapted set-ups are possible to allow severely involved male patients, to shave themselves. An electric razor in a holder can be used in a feeder swivel arm, on a stand, or used in a swivel arm attached to a wall.

ADJUSTABLE BED LAPBOARD

The patient who must be confined to his bed for long periods of time needs an adjustable bed lapboard. The patient who uses feeders on his wheel chair can use one of these boards for

Figure 4. Mighty Midget Hoist in use.

reading, writing and certain recreational activities by developing proficiency with a mouthstick. Mouthsticks may be made of wood, plastic, or aluminum. The mouthpiece may have an acrylic bite, hard rubber, or plastic. A holder for the mouthstick that can be applied at any position on the bed lapboard eliminates holding the stick in the mouth continually. The curb detector to position pages of the book is useful on the bed lapboard too. Very often this board can serve a dual purpose as a car lapboard to support the upper extremities and help position the patient.

Horizontal Extension Reachers

Horizontal extension reachers are ortheses that markedly increase horizontal range of motion of the upper extremities. Forearm support is provided without a see-sawing motion. The swivel arms must be reinforced because the metal will bend with the weight of the extremity in full extension. Usually the forearm support needs to be more stable than the regular feeder forearm support, thus up and down motion must be eliminated. The forearm support comes down closer to the work surface but does clear it. These ortheses have been valuable to students, draftsmen, and many patients returning to desk jobs and to housewives for sewing and kitchen activities.

The length of the two swivel arms is determined by the amount of motion the person can control. The usual length of each is 10 to 12 inches.

Portable Wheel Chairs

Portable wheel chairs require great consideration and much thought before ordering. This may be the patient's most valuable orthesis. It is an expensive one, but if it can make the person independent or even partially independent, it is worth much more than the money involved. The criteria for selecting a portable chair are:

1. The patient must be comfortable and in good alinement.
2. Chair must be the one that will make the patient as independent as possible in his home and work environment in view of the muscle power he possesses.

There are many sizes, styles, and special features available in portable chairs today. The patient should try the chairs for size and to determine which type he can propel. Specific functional training technic should be tried to determine what special features are needed to make the patient independent. Each chair has advantages and disadvantages and should be carefully evaluated before a definite decision is made.

Chair Narrower

A simple wheel chair narrower is a device which permits travel through narrow doorways. It anchors to the arm of the chair and pulls the seat together up to $2\frac{3}{4}$ inches by a rotary motion. It is easily removed.

Adapted Mighty Midget Hoist

We would like to demonstrate the adaptation made by a patient of a Mighty Midget Puller into a lift for severely involved patients. This puller is used by linemen to pull wires, and in machine shops to lift heavy parts on and off machines. Twenty-eight pounds of pressure will lift 500 lbs. A bar with chains, canvas back rest and seat is attached to the puller. The puller must have an overhead support. A ring anchored in the ceiling with a metal cable hanging from it has been used; however, a section of sliding door track installed in the ceiling is more practical. Patients who rent their homes cannot apply either of these so a portable frame has been designed (Fig. 3). A luggage rack type of support plus a metal bar on top of the car makes the Mighty Midget practical for getting the patient in and out of the car. A ratchet type hoist can be operated with limited upper extremity power or by an attendant for the completely

disabled (Fig. 4). It is small, easy to transport, and is inexpensive. We have found it the most practical way to handle severely involved patients.

CONCLUSION

There are certain factors of evaluation the physical therapist must consider during the training of the patient.

1. Does orthesis fit correctly?
2. Does it perform the purpose for which intended?
3. Is it functional or does it interfere with function?
4. Does the patient realize the value of the equipment?
5. Are any modifications, changes or repairs needed?
6. Are coordinate patterns of motion encouraged and are substitute patterns allowed only after assurance that coordinate patterns are impossible?
7. Has the patient learned appropriate care of ortheses?
8. Have the parents been taught the correct adjustments, exercises, precautions, and the importance of the child's orthesis?
9. Have the patients acquired healthy attitudes toward necessary permanent ortheses?

If you can answer these questions affirmatively *you are executing your responsibilities as a physical therapist in the training of orthetic devices for function.*

Fees for Rehabilitation and Treatment Center Services

Michael M. Dolnick, M.A.

One of the continuing problems confronting the administrator of a rehabilitation center is the setting of proper fees for services. In this relatively new field, data on this subject have been difficult to obtain. The need for an exchange of information on fees prompted the National Society for Crippled Children and Adults to conduct a study of the problem in cooperation with the Conference on Rehabilitation Centers.

In the Spring of 1955, a questionnaire concerned primarily with fees charged and methods for setting such fees was sent to all members of the Conference. Replies containing usable information were received from 50 of the Conference members. Lack of homogeneity in Conference membership, however, presented some difficulties in tabulation and analysis. Conference members include public tax-supported facilities which charge no fees; voluntary agencies with specialized fund raising technics who are not dependent upon fee income for a major proportion of operating costs; and a few agencies which charge little or no fees as a matter of policy and philosophy.

To fee or not to fee has been discussed in principle in an excellent pamphlet published by Community Chests and Councils. According to CCC there appears to be general agreement among all types of agencies that some payment for services, no matter how small in amount is generally desirable. Casework services may regard fee payment as an aid in eliminating their identification with pure relief-giving functions and in interpreting their role as a community service for persons from all income levels. The therapeutic value of fees as a treatment factor is also an important consideration for casework and guidance agencies. Child guidance and mental hygiene clinics have a general practice of charging fees to all clients who can afford to pay for service. Leaders in the field state as reasons for this practice:

1. The fact that many clients are able to pay

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some part of the cost and it is entirely normal for them to do so.

2. The feeling that payment of a fee is important therapeutically and can be used as a factor in treatment.

The responsibility of the client to pay as *much* of the cost of the service as he can afford is not, however, universally accepted. The fee policies of different types of health and welfare agencies vary between two extreme points of view which can be stated briefly as follows:

1. The same fee should apply to everyone so that no distinctions are drawn between persons from different economic or social levels. The charge should be low enough so that it cannot be a factor in discouraging participation of persons with little initial interest in the service.
2. Fees should represent the actual cost of providing the service, but adjustments should be made in applying the charge to individual participants in proportion to each one's ability to pay. In this way contributed funds are used for those who cannot pay the full cost, rather than being used to subsidize service for some persons who can afford full payment.

Among the rehabilitation centers that are members of the Conference on Rehabilitation Centers, there is some support for both points of view. This was ascertainable even though the majority of respondents failed to answer the question that asked whether a formula or plan was used for arriving at the amount of fees. Only 8 of the 50 respondents indicated that the factor of cost had played a role in the setting of fees.

A refreshingly frank statement by a director of an Eastern rehabilitation center illustrates one phase of the problem of setting fees based on costs. She states: "We have done a cost analysis which reveals that the hourly rates in practice are below cost. However, in accord with some inefficiencies in our own operation and community practices, we cannot justify a higher rate." Prevailing rates are probably the most important factor influencing fees charged. Regardless of all the intrinsic cost factors, no center wishes to be very far out of line in its charges. As a matter of fact most administrators determine their charge more on the basis of prevailing fees in the community than they do on actual cost factors.

Proponents of setting fees based on costs are Arthur A. Rodriquez, M.D. and Alfred R. Rodriquez, C.P.A. In a recent article in the *Physical Therapy Review* their point of view is well stated.

> "It is desirable to establish charges on a scientific basis and not on the basis of the philosophy that 'the worth of the thing is what it will bring.' This latter idea will bring the field into disrepute eventually and will reflect unfavorably on the entire medical profession. Charges can be defended if they are based upon a careful consideration of all the elements of cost. At the same time they will assure the institution a just compensation for its services to the patient."

The Rodriquezes formulate a step by step procedure for determining costs of service which takes into account hourly equipment costs, hourly labor costs, and hourly overhead rate. It is an article well worth reading and merits the attention of rehabilitation workers.

Fees in general hospitals present slightly different problems. Hospital administrators generally believe that the ancillary services of a hospital, including physical therapy, should at least meet their costs. This should cover salaries, supplies, building maintenance and administrative expenses, provision for equipment replacement and unpaid accounts. In some hospitals, to maintain the solvency of the institution, the department may be expected to help carry services which traditionally operate at a deficit. In cases like these it is unjust to conclude that charges are too high because a department's income exceeds its salary obligations (Ludewig).

Fees Charged by Conference Members

Not all centers offer the same services. Consequently, the summaries which follow are based on different numbers of responses. The statistical information is presented for comparative purposes only and no inference should be made that a certain fee or method is recommended because it is charged by a majority of the centers.

Of 50 respondents, only 5 had no fee policies and these were centers supported partially or wholly by tax funds. Eighteen centers assessed fees on a unit basis (specific charge for each service, i.e., so many dollars for an occupational therapy treatment); 19 centers assessed fees on a per diem basis, (rate per day, half day, hour, and half hour); and 7 centers had a fee schedule combining both methods of payment. One center gave no information on this point.

Fees Based on Unit Method

A. Medical and diagnostic evaluation—based on reports from 14 centers.

Range: $5 to $75
Most frequent charge: $10.00
Median charge *: $12.50

B. Fees for a single therapy—based on reports from 25 centers.
Range: $1 to $10
Most frequent fee: $2.50
Median fee: $3.30

C. Fees for a combination of two therapies—20 centers reporting.
Range: $2.50 to $10.00
Most frequent fee: $3.50
Median fee: $4.50

D. Fees for a combination of three therapies—17 centers reporting.
Range: $2.50 to $15.00
Most frequent fee: $5.00
Median fee: $5.75

E. Fees for psychological evaluation and services—17 centers reporting.
Range: $2.50 to $50.00
It is obvious from this extreme range that the type of service varies considerably and may include the administration of a simple test to comprehensive testing and evaluation services.
Most frequent fee: $12.50 to $15.00
Median fee: $18.00

F. Fees for vocational counseling service
Only 6 centers reported fees for this service which ranged from $2.50 to $25.00. The median fee was $7.00.

Fees Based on Per Diem Method

A. *Half-hour rate*—9 centers reporting.
Range: $1.00 to $10.00 (when a high half-hourly rate such as $10.00 is reported, it is due to a minimum fee policy regardless of time involved.)
Most frequent fee: $2.50
Median fee: $2.75

B. *Hourly rate*—13 centers reporting.
Range: $1.00 to $10.00
Most frequent fee: $4.50
Median fee: $4.20

C. *Half-day rate*—20 centers reporting.
Range: $4.00 to $12.50
Most frequent fee: $6.50
Median fee: $6.50

D. *Full-day rate*—22 centers reporting.
Range from: $5.00 to $30.00
Most frequent fee: $10.00
Median fee: $10.00

* Median refers to the mid-point. One half of the centers charged more than the median and one-half charged less.

The full-day rates require additional explanation. Included are residential facilities offering complete inpatient care as well as centers having no services of this type. It was not possible to tabulate these two types of services separately, which lessens the value of these figures.

It should be noted that the above computations are based on published or announced fees. Many of the centers utilize a sliding scale based on patient income for determining fees, and the fees actually collected may bear little relation to the published fee schedule. One center, for example, with a maximum unit rate of $5.00 a treatment, collects an average of $1.00 to $1.50 a treatment from private patients, and $3.00 from organizations and agencies referring patients. In this center, fee income accounts for only a small portion of total income.

Adjustment of fees to income is generally based on the social service interview. Certain centers have in addition, detailed schedules of income and fee ratios. A most detailed schedule of this type has been prepared by Mobility, Inc. of White Plains, New York, a copy of which may be requested from that organization.

In comparing fees charged by the various centers there seemed to be no correlation between amount of fees and size of the center. Centers serving the largest number of persons had fee schedules similar to those in centers serving relatively few. The size of the center also seemed to have no relation to the percentage of total income accounted for by fees.

Because of incomplete reporting on the relation of fee income to total operating cost it was not possible to give a detailed summary of this point. At least 6 of the 50 centers receive all of their income from patient fees, and at least 21 centers receive 50 per cent or more of their income from fees. As would be expected, centers supported by tax funds and those affiliated with national organizations having their own fund raising drives generally received a much smaller percentage of their income from fees.

These fees currently in effect in various centers should not be considered as satisfactory guides for the charging of service in comprehensive rehabilitation centers. As can be seen, current fee practice is largely based on fees for different therapies. With the growth and development of comprehensive rehabilitation centers, the therapy approach to fee setting will prove quite inadequate for centers that include a wide range of services, particularly vocational counseling and prevocational activities. It becomes evident that

fee setting based on cost analysis becomes more essential as the services offered become more comprehensive. In comprehensive centers serving the very difficult cases with severe psychosocial and vocational problems, it is probable that the service will have to be subsidized and will seldom if ever operate solely on a private patient fee basis.

This cursory exploration into the subject of fees for rehabilitation services illustrates the need for additional study. Further discussion on the philosophy of fee charging would be of benefit. In addition it may be well to consider instructional seminars for rehabilitation center administrators in cost analysis and rate setting. The research activities of the Rodriquez team in this connection should be encouraged and expanded. The trend appears to favor the setting of fees by scientific and accounting methods and undoubtedly the fee schedule of the future will be just and equitable for both the patient and the center.

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Functional Method of Pre-Crutch Exercise

Robert J. Hickok, B.S., and Edgar Schiller, M.A.

Crutch walking for the average person suffering a temporary disability is usually performed with comparative ease and with rapid attainment of skill and proficiency. On the other hand, crutch walking for the severely disabled may be accomplished only after months of intensive exercise and practice. Each step requires consumate skill and maximum effort with muscle strength far in excess of normal. The methods of promoting muscle hypertrophy are well established and the studies made by Dr. Thomas De Lorme and associates form a solid foundation for the large amount of fine work that has followed. It is the purpose of this paper to present a functional method of progressive resistive exercise for the shoulder girdle, arms, and trunk, as they are utilized in the crutch walking sequence, for that group of patients who literally "walk on their hands."

An analysis of shoulder girdle and trunk musculature involved in crutch walking reveals the similarity between push-ups from a chair and crutch walking. This has long been used as a convalescent exercise from wheel chairs and as an active lead-up exercise in mat programs. Crutch walking might be called a standing push-up since a degree of shoulder depression and complete or partial elbow extension (depending on lift needed) occurs in each case. In an effort to utilize the full potential of the push-up as a resistive exercise, the staff at Miriam Hospital devised and had constructed the weight vest and adjustable chair. This paper will deal solely with the description and use of this equipment.

Robert J. Hickok, Physical Therapist, Miriam Rehabilitation Division, Jewish Hospital, St. Louis; Edgar Schiller, Vocational Counselor-Psychologist, Director of Vocational Activities, Western New York State Cerebral Palsy Association.

Description of equipment

1. Weight vest

A glance at the weight vest makes one think of a simple hunting jacket. Closer inspection reveals a snugly fitting, sturdily constructed vest of medium weight canvas duck with four pockets symmetrically placed on front and back (Fig. 1). The pockets are of sufficient size to accommodate all sizes of De Lorme type weights up to 25 lbs. The vest is of double thickness throughout with triple stitching and rivets in obvious points of stress around the pockets. The shoulders are cut full and padded with felt to reduce the possibility of pain from pressure. The two attachment straps are made of one inch cotton webbing with removable friction type catches; thus facilitating convenient laundering. Experience has indicated that two different size vests are necessary to fit all patients. The smaller vest conforms roughly to

Figure 1. Rear view of weight vest (note method of incorporating felt pads over the shoulder region)

a size 38 jacket, while the larger is equal to a size 44 jacket. The maximum weight it is possible to carry is 120 lbs. This, coupled with body weight, makes available a more than adequate resistance.

2. Adjustable chair

Originally, push-ups were carried out in wheel chairs; however, the arm rests were too low to provide adequate shoulder girdle excursion. It then became obvious that to utilize the full potential of an exaggerated push-up, the elbows must be flexed to 120 degrees and the feet must be free of the floor; therefore, the adjustable chair (Fig. 2) was devised. It can be quickly adjusted to any size person and serves to standardize the exercise. Both the seat and arm rests are movable, the seat having an 18 inch vertical excursion and the arm rests having a 24 inch vertical excursion. The chair is constructed of ¾ inch plywood. Seat mobility is provided by a scissor type automobile jack (Fig. 3) with 4 heavy springs attached at the seat corners to add lateral and anteroposterior stability. The anterior seat margin is recessed to accommodate patient's legs. Attached to this is a ½ inch roller which moves freely and allows frictionless leg movement during push-ups. The cantilever style adjustable arm pieces are of simple dual pipe construction and are made of 1½ inch cast iron pipe with 8 adjustment holes. These pipes are slightly larger

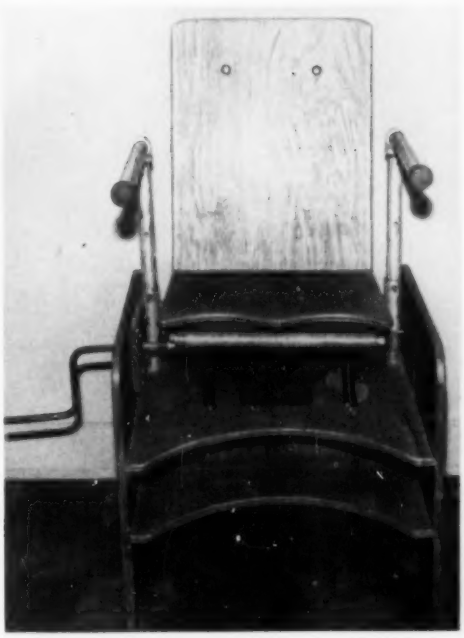


Figure 2. Adjustable chair

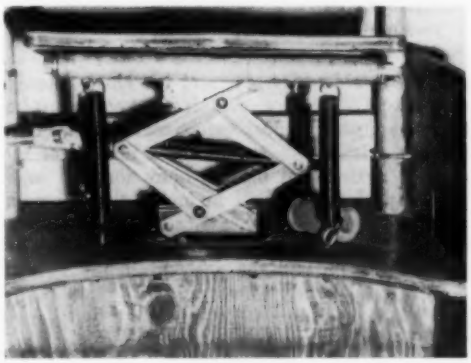


Figure 3. Close-up of scissor jack attachment (provides seat mobility for adjustable chair)

than crutch hand pieces thus serving to facilitate change over to crutches.

Technic

Obviously, the patient must be able to complete 10 active push-ups before adding the weight vest. The hands are placed slightly forward or directly

Figure 4. Weighted push-up from chair (initial position)

parallel to side (Fig. 4), and the elbows flexed to at least 120 degrees. At this point care must be taken to prevent substitution movements. One favorite trick is to stabilize the elbows at 60 degrees flexion and lift the body forward in a partial push-up. It will be noted that when a proper push-up (Fig. 5) is executed the shoulders at the glenohumeral junction come abruptly into depression and the posterior trunk swings upward and slightly forward.

Discussion

Basically, the purpose of a P.R.E. program is to promote muscle strength in the shortest period of time possible. It would then seem that the only requirement would be to add resistance to a movement pattern and increases in strength would follow at regular intervals. For example, if an increase in strength in the quadricep group is desired, and the neuromuscular network is intact, the only problem then is to add a weight boot to the patient's foot and have him carry it through a 90 degree arc until the leg is fully extended. This single movement pattern type P.R.E. program is generally adapted to pre-crutch walking routines. At Miriam Hospital, prior to the development of the weight vest and chair, 8 or 9 separate movement patterns were in the shoulder girdle routine. These were: (a) humeral flexion, (b) humeral adduction, (c) humeral abduction, (d) external and internal rotation, (e) horizontal adduction, (f) hyperextension, and (g) elbow flexion and extension. These exercises work well initially with appropriate increases in strength being recorded at weekly intervals, and certainly have an important place in any pre-crutch walking program. It is the opinion of the physical therapy staff, however, that these single movement pattern exercises fail to provide a complete pre-crutch walking program. It has been observed that:

1. After a short period of gait training, patients manifested a marked amount of muscular hypertrophy throughout the shoulder girdle, trunk, and arms. We accepted this to mean that the preconditioning program had fallen short of its goal.
2. Patients frequently complained of pain over

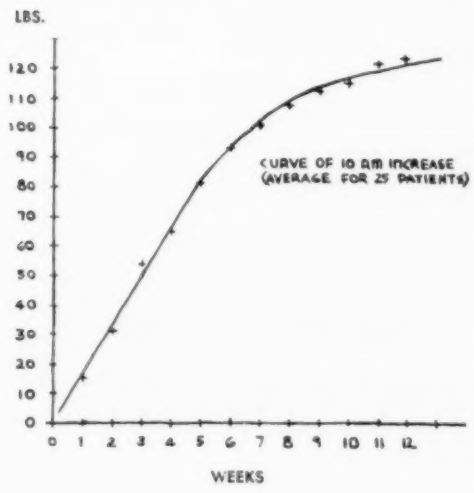
Figure 5. Weighted push-up (completed position, lateral view)

the dorsal wrist area and olecranon process, many times to the point that ambulation had to be stopped for a short period of time. We felt that this was at least partially due to severe pressure on the wrist in a partly extended position and to unaccustomed stress on the olecranon process.

3. Finally, and possibly the most important point, patients had no conception of initiating trunk control, particularly posterior trunk control, while walking with crutches and braces. Abramson states that the latissimus dorsi muscle, by virtue of its high innervation C6-7-8 from the bracial plexus through the thoraco-dorsal nerve, and its broad origin along the thoracic and lumbar spinus processes and superior iliac crest, can be properly strengthened by a functional type exercise to play an important part in posterior trunk control. He aptly points out that while the normal function of the latissimus dorsi muscle is to adduct, extend, and internally rotate the humerus, with the shoulders fixed (as in the swing phase of crutch walking) a reversal of action is brought about and the latissimus tends to pull the trunk upward and slightly forward and to act as a stabilizing mechanism.

The problem then, as stated before, is to emulate the crutch walking pattern with an adequate resistance. The complex interaction of arm, trunk, and shoulder muscles during crutch walking can only be met by a functional exercise. The justification for using the weight vest and adjustable chair is that, to an acceptable degree, they meet these requirements.

Figure 6. Curve of 10 RM increase (average for 25 patients)



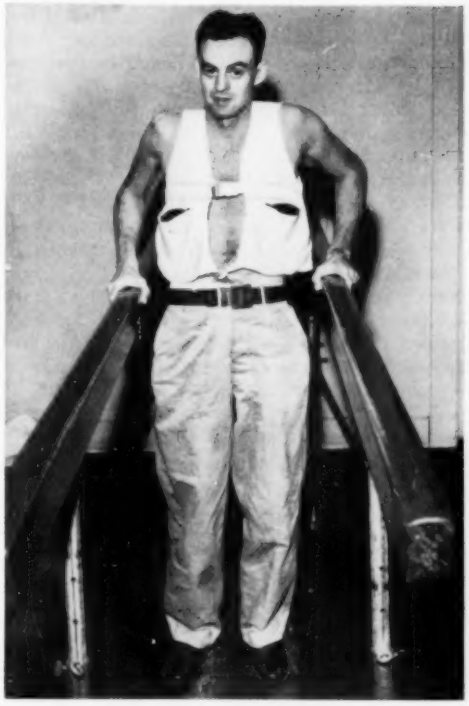


Figure 7. Weighted push-up in parallel bars (completed position)

For the past year and a half, all patients who were prescribed pre-crutch walking P.R.E., at Miriam Rehabilitation Division of the Jewish Hospital used the weight vest and when available the adjustable chair. This group was comparatively small, numbering only 27 patients. The vest was tested also by staff members and students, and necessary changes were made from time to time. Of the 27 patients who used the vest, 25 carried out the program long enough (2 months) to be considered as having completed the program.

The standard procedure at Miriam Hospital has been to use the weight vest and chair as an adjunctive measure to the regular P.R.E. program on the mat. The standard 30 repetition regime as put forth by De Lorme is followed; i.e., a 10 Resistive Maximum * is determined the

* 10 Resistive Maximum—amount of weight a patient lifts 10 times.

first day and a routine ½ 10 RM—¾ 10 RM and 10 RM is followed for the 4 succeeding days. This program is not rigidly adhered to, however, and 10 RM changes are made more frequently if indicated. As with other types P.R.E., dramatic gains in strength are noted from weighted push-ups, particularly during the first 2 week period. One ambitious patient increased his 10 RM from body weight to 100 pounds in a 6 week period. Typically, however, the average patient, while making significant improvement in strength, generally followed the 4 day 10 RM program. An average gradient of 10 RM increase is shown in figure 6. While paraplegic patients formed the largest single group using the vest and chair and more than any other group need vigorous exercises of this type, 5 amputee, 2 multiple sclerosis, 1 poliomyelitis and 3 fracture patients also used it, all with good results.

The 20 male patients who carried out weighted push-ups as part of their pre-crutch walking routine had a beginning 10 RM of body weight to 30 pounds. The final 10 RM of this group increased to the 75 pounds—120 pounds range. Only 5 female patients used the vest in the past 1½ years. These patients all started at body weight and progressed to a final 10 RM ranging from 40 to 50 pounds. The body weights for the entire group were from 100 pounds to 155 pounds. It must be assumed that body weight generally adds the major portion of resistance during the push-ups since the body is essentially free of the chair at the height of the push-up. The importance of this is apparently secondary to the other factors that affect a patient's ability. For example, a 20 year old patient might rapidly attain a 10 RM of 120 lbs and have a body weight that may or may not reach this level. Generally it was found that in patients past the age of 40, the speed-of-strength increase slowed and there was a gradual reduction in maximum 10 RM in terms of absolute weight, regardless of body weight.

Parallel bars

Many times, patients received braces before completing conditioning program; on these occasions the weighted push-ups were continued in the parallel bars. The bars were elevated to an exaggerated push-up position (Fig. 7) and the same program was continued as from weight chair. Also it was found that several patients who limited their pre-crutch program solely to weighted push-ups, progressed satisfactorily in gait training.

Results

Since patient performance, in this instance, is the only practical measuring stick, a subjective evaluation of participating patients has indicated that the weight vest has been a valuable adjunct to our P.R.E. program. All patients completing a 2 month period were adequately prepared for crutch walking. It was noted, with interest, that patients did not exhibit the "blooming" hypertrophy throughout the shoulder girdle as we had previously seen. As anticipated, a 2 month period of exercise, with stress conditions of crutch walking equaled or surpassed, practically eliminated the problem of pressure over the dorsal wrist area and olecranon process. All patients exhibited a fundamental understanding of using the large back muscles in balancing. One adept young D4 paraplegic performed unusual ambulatory feats such as stair climbing, two steps at a time, and doing an extremely long swing-through gait with Canadian canes. One other D12 paraplegic became independent with a swing-through gait 2 weeks following acquisition of braces. Within 6 weeks, this same patient was independent over all surfaces, curbs and ramps, and could go up stairs two steps at a time.

SUMMARY

A functional method of administering pre-crutch walking progressive resistive exercise is described; primarily, as an adjunct to the existing routine. Its use on a limited number of patients has been successful in preparing patients for crutch walking.

The authors wish to gratefully acknowledge the assistance given them by John W. Deyton, M.D., Medical Director, Miriam Rehabilitation Division, Jewish Hospital, and the Miriam Hospital Physical Therapy Staff.

The authors also wish to thank Mr. William Burke of the B. & H. Orthopedic Appliance Co. for his valuable assistance in the design and construction of the weight vest.

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A Prayer for Thanksgiving

ALMIGHTY GOD, we approach this season with thanksgiving in our hearts for the many blessings we do daily enjoy. Many of these, our Father, we are so prone to take for granted, and daily we do use and appropriate them in our lives, but so seldom do we think of them, and even less seldom do we thank Thee for them.

We thank Thee, our Father, most of all at this season that we are among the living. We thank Thee for medical care and experience in technology for which we owe our lives, especially when we look to other parts of the globe and see others suffering from causes that would be considered minor here.

We thank Thee, our Father, that polio does not affect our eye sight. We are indeed grateful for the printed page, for the abundance and variety of material that is available to us for reading, for men have not always been so fortunate as to have printed matter available to them so abundantly and so inexpensively. We thank Thee, our Father, for the advent of television which causes us who are limited to one small area of our land to be able to vicariously enjoy and appreciate the scenery and the culture of America as a whole.

Our Father, we are grateful indeed for institutions such as this where we are cared for with loving kindness, where we are adequately fed and where we are considered as rational human beings who are interested in their own problems and destinies; where we are guided rather than ordered; where we are helped rather than ignored. We thank Thee for voluntary as well as civic philanthropy in the form of acquiescence to taxation. We are grateful for the attitude that is manifest in the public today in not considering us as freaks or unimportant, but consider us as unfortunates who might have been themselves.

Ours has been the privilege of having once been normal and having lived the more important part of our lives as normal beings in our society. We have grown up under our parents' guidance—we have gained our education—many of us have served in the Service, and many more of us have courted, married, and become parents ourselves. We are truly thankful that we were able to go thus far in life with normal facilities, and we would pray, our Father, that our minds might be kept in proper perspective as we go on continually making adjustments.

Grant us, we pray, the ability to be fresh in our thinking, positive in our attitude, and unembittered and free from a continual reliving of the past in our fancy.

We thank Thee for the privilege of being Americans where we are free to worship Thee, indeed where our Nation has set aside a day in which we thank Thee for our blessings to us collectively and individually. We thank Thee for the leadership of this country and for the peace that prevails throughout the world at this time. We would pray for Thy continued guidance of our leaders that they may be wise in their decisions of world moment; that they may seek guidance from Thee and honor Thy infallible truths is our prayer. Amen.

DOUGLAS JENNINGS

Written by Douglas Jennings, a patient at Rancho Los Amigos and Editor of the *Weakly Breather* (November 1955). Reprinted with permission of the publication and The Rancho Los Amigos Respiratory Center, Hondo, California.

Editorial

When letters, similar to the one that follows, reach the editor's desk, it is assumed that other readers also have given thought to the same questions. With this in mind, the editor has published "a letter" and "the reply," hoping that in this way, your questions may be answered too.

DEAR EDITOR:

I enjoy reading the "Abstracts" in the *Physical Therapy Reveiw*. It is a quick way to help me keep abreast of what is being published in the voluminous number of medical periodicals. Goodness knows, I'd never have time to search for and read all the articles, even if the journals were available to me.

While I'm not interested in all the abstracts, it seems that those which are of vital concern to me are too short to satisfy my curiosity on the subject. Would it not be possible to make the abstracts more detailed? I live half way between Nottown and Rattle Snake and neither place has a Medical Library where I can get the original article to read.

Yours for more and longer abstracts,

M. MILTON
Physical Therapist

DEAR MR. MILTON:

Thank you very much for your letter expressing an interest in the "Abstract" section of the *Physical Therapy Review*. The Editorial Board is always delighted to receive suggestions for your professional organ. We stand ready to serve you and it is only through your letters and comments that we can know your desires.

In regard to your inquiry concerning the abstracts; if you will notice the dates of publication of the articles, you will see that none of them are more than three or four months old. It takes three months for publication once the *Review* has been assembled for press. The several physical therapists responsible for the abstract section scoop the medical journals as they come from the printers, read, select and

Editorial

condense the original articles and rush them to the National Office to meet the publication deadline. This is a large undertaking since medical periodicals are published at different times of the month; some are published weekly, others monthly, and still others bimonthly.

If there are too many abstracts for the allotted space some of them must be held over until the following month. Increasing the length of the abstract limits the number published in any one journal. Actually the Editorial Board is interested in summarizing the article in just as small a space as possible.

There is, however, a solution to your problem. As you possibly know, authors or the institution with which they are affiliated purchase reprints of the articles at the time of publication. Most authors are happy to find someone interested in their work and will most generously send you a reprint upon request. This can be expedited more quickly if you send a self-addressed post paid envelope.

Since the medical library, and thus the journals, are not available to you, in the future each abstract will include the address of the author.

We hope this will expedite your obtaining the complete articles of your particular interest.

EDITOR-IN-CHIEF
Physical Therapy Review

1956 OVR-APTA Institute Papers

For two years the Office of Vocational Rehabilitation has awarded grants to the American Physical Therapy Association for joint sponsorship of institutes. The papers of the *Correlation of the Basic Sciences with Kinesiology* presented at the 1955 Institute were published this past September, and those presented in 1956 will be published soon. The topic of the 1956 Institute was the *Correlation of Physiology with Therapeutic Exercises*, and the program follows:

Participants	Topics
Sara Jane Houtz	Exercises for Improvement of Muscle Strength
H. J. Ralston, Ph.D.	Some Considerations of the Physiological Basis of Therapeutic Exercise
Laura K. Smith	Exercises for Endurance
Ernst Fischer, M.D.	Physiological Basis for Exercises for Endurance
Florence P. Kendall	Range of Motion
Ernst Fischer, M.D.	Physiological Basis of Volitional Movements: Methods Used to Elicit, Reinforce and Coordinate Muscular Response.
Sara Jane Houtz	Part I — Remarks on Motor Learning
Edna Blumenthal	Part II — The Brain-Injured
Signe Brunnstrom	Part III — Adult Patients with Hemiplegia
Ernst Fischer, M.D.	Physiological Basis of Methods to Elicit, Reinforce and Coordinate Muscular Movements

The manual will be approximately 90 pages in length, will contain many diagrams, will be photo offset with hard cover, and the expected price is $2.75.

Member Joins A.M.A. Staff

On August first Wallace Wesley, B.Ed., M.S., Hs.D. became consultant in health and fitness in the American Medical Association's Bureau of Health Education. There she will work with other staff members in furtherance of the health of the school-aged child.

Miss Wesley who received her physical therapy education at Fitzsimons General Hospital has been a member of the American Physical Therapy Association since 1944.

Prior to her present appointment she was on the faculty of Iowa State Teachers College, and before that taught kinesiology and body mechanics at Northern Illinois State Teachers College.

She was granted her doctorate in health education in 1952 by the University of Indiana following graduate work at Stanford University. Miss Wesley was co-author with Marian Williams of an article published in the March 1951 issue of the *Physical Therapy Review*, "Hip Rotator Action of the Adductor Longus Muscle."

Association Activities

Mrs. Elin Lagerquist Wiswald of Stevens Point, Wisconsin, passed away May 24, following a long illness. At the time she became a member of the Association and Wisconsin Chapter in 1941 she was Supervisor of the Orthopaedic Service of the Visiting Nurses Association of Milwaukee and then joined the Army Nurse Corps. She graduated in physical therapy from Northwestern University.

Marguerite Collins, of Denver, Colorado, passed away in September, 1956. Miss Collins graduated from Reed College in 1918 and served at Fort Sam Houston, Texas, during 1919 and 1920. She was actively engaged in physical therapy until her retirement in 1953. At the time of her death Miss Collins was a Life Member of the Association and the Colorado Chapter.

Marriages

Dorothy Boschert, of University City, Mo., to Charles B. Ladd, St. Louis, Mo.

Marilyn Cleffi, of Dover, N. J., to John W. Groome, Jr., Newark, N. J.

Yvonne U. deBeaulieu, of Malden, Mass., to Earl R. Burdette, North Chelmsford, Mass.

Patricia Dewey of Simsbury, Conn., now Mrs. Patricia D. Wiles, San Angelo, Texas.

Salvatore E. DiFede, Jr., of Jacksonville, Fla., to Mary V. DeGroff, Richmond, Va.

Jannett Felie, of Hazardville, Conn., now Mrs. Jannett F. Sutherland, Haddonfield, N. J.

Donna D. Flaugher, of Longview, Wash., to Ervin Jensen, Bremerton, Wash.

Mary L. Gibson, of White Plains, N. Y., now Mrs. Mary G. Cubelli, Scarsdale, N. Y.

Dorothy Griffin, of Denver, Colo., now Mrs. Dorothy G. Woods, Baton Rouge, La.

Elaine Kerson, of North Adams, Mass., to Sheldon Katz, North Adams.

Minerva J. Kunze, of San Antonio, Texas, now Mrs. Minerva K. Staat, Tampa, Fla.

Ruby Laster, of Nashville, Tenn., to Ralph S. Alexander, Gastonia, N. C.

Dixie J. Martiel, of South Gate, Calif., now Mrs. Dixie M. Magnusson, Lynwood, Calif.

Patricia Martin, of Madison, Wis., to Paul H. Graven, Madison.

Jean M. McDermott, of Margarita, Canal Zone, now Mrs. Jean M. Brandl, Cristobal.

Patricia L. McLaughlin, of Wauwatosa, Wis., to William L. Albrecht, Madison, Wis.

Margaret N. Meyer, of Shreveport, La., to James Greenwell, Shreveport.

Lydia Miller, of Charlotte Amalie, Virgin Islands, to Alton A. Adams, Jr., Mather AFB, Calif.

Sallyann Palen, of Whittier, Calif., to Stephen E. Pontier, Whittier.

Elizabeth Pogue, of Brooklyn, N. Y., now Mrs. Elizabeth P. Mansfield, Brooklyn.

Marilyn Ring, of Brighton, Mass., now Mrs. Marilyn R. Harris, East Orange, N. J.

Marilyn Ritger, of Washington, D. C., to Thomas J. Smith, Washington, D.C.

Marilyn Rusler, of Anchorage, Alaska, now Mrs. Marilyn R. Williams, Anchorage.

Claire Wuerl, of Detroit, Mich., to Alan Curtis, Chicago, Ill.

Member Co-author of Article

Edith L. Nyman of Grace-New Haven Hospital is co-author with T. F. Hines, M.D., and G. K. de Forest, M.D., of an article, "Mobile Home Treatment Unit for Rheumatism and Arthritis," which was published simultaneously in the July 1956 issues of the *British Journal of Physical Medicine* and the *Connecticut State Medical Journal*

Chapter News

Michigan

The Michigan Chapter is publishing the "APTA Conference Reporter" as a means of coordinating their efforts to make the 1957 Conference in Detroit a success. The "Conference Kick-off" which was held in May was attended by 67 members, and Mary Haskell was there to assist the chapter in conference planning.

South Carolina

The South Carolina Chapter reported a very successful fall meeting held in Charleston with 50 per cent of the membership attending. A lecture on the role of physical therapy in psychiatry opened the all-day session.

Demonstrations of functional testing, functional training, and electromyography were presented. Following the meeting the group gathered at the home of Mrs. Rita Hutts for a social hour and supper. Plans for the winter and spring meetings were announced.

WORLD CONFEDERATION FOR PHYSICAL THERAPY *News*

Message from the President of the World Confederation for Physical Therapy

The Second International Congress of the World Confederation for Physical Therapy held in New York is already behind us but what memories those who attended must have carried away with them. So much friendliness and kindly greetings from our hostess country, so many old friendships renewed, and so many fresh ones formed with physical therapists from all over the world.

In London in 1953 perhaps there was a feeling of wonderment that in so short a time the World Confederation for Physical Therapy had become a living entity. This year in New York we had the knowledge that we were an International Body recognized by the World Health Organization and that already some of our responsibilities and possibilities were taking shape. Our family is growing with the admission of new member nations and others applying for membership. The feeling of genuine International Goodwill as "nigh-dwellers" (as Miss Mildred Elson so aptly put it) is what we shall have taken away with us. We realized that we had a common language in physical therapy which would surmount all barriers.

During the Second International Congress so much enthusiasm was shown that it should be infectious and the returning members will already have been able to pass on to their colleagues at home some of their enthusiasm.

A program of work to be done emerged during the meetings of the Executive Committee but there is no doubt that carrying out this program will depend upon the effort expended by each one of the National Societies. In our work as physical therapists the criterion is always the "good of the patient" and the World Confederation for Physical Therapy needs the support of each individual physical therapist through his or her own National Body if it is to fulfill the program decided upon by the Executive Committee. In this way we can contribute something towards better health in the world.

I take up my responsibiltiy as your President strengthened by the knowledge of all the good wishes you gave me and I hope that during the next three years the World Confederation for Physical Therapy will continue to prosper. We now have our Third Congress in Paris in 1959 to look forward to and indeed to work for.

G. V. M. GRIFFIN
President

DEAR MISS HASKELL,

I am instructed to convey to you the following resolution passed at the general meeting of the World Confederation for Physical Therapy held during the Congress in New York in June last:—

"It was resolved that the grateful thanks of the World Confederation for Physical Therapy be conveyed to the American Physical Therapy Association and its President Mary Nesbitt for the devoted efforts of the Board of Directors of the Association, its National Office staff, members of the New York District of the New York Chapter, and of Catherine Worthingham, Chairman and Members of the Congress Planning Committee."

Physiotherapists have returned to their own countries newly inspired by the Congress and by the aims of the World Confederation and I hope that all of you in the United States who provided such a wonderful Congress will feel that your efforts were well worth while. Please accept the very grateful thanks of the World Confederation for Physical Therapy.

Yours sincerely,

M. J. NEILSON
Hon. Secretary

Student Section

Regional Student Editors

Region I—Editor Audrey Haugaard—Simmons College
University of Connecticut
Boston University
Bouve-Boston School
Simmons College
University of Pennsylvania
The D. T. Watson School

Region II—Leanne E. Taintor—Columbia University
Columbia University
Albany Hospital (Russell Sage College)
New York University
University of Buffalo
Frank E. Bunts Educational Institute
Walter Reed Army Hospital (May-Sept.)

Region III—Editor Marcia Field—Med. College of Virginia
Medical College of Virginia
Charity Hospital of Louisiana
Duke University
Baylor University
Hermann Hospital
University of Texas
Medical Field Service School (Sept.-May)
Brooke Army Hospital (May-Sept.)

Region IV—Editor Carol Vacca—St. Louis University
Northwestern University
State University of Iowa
University of Kansas
Washington University
St. Louis University
University of Oklahoma
Ohio State University

Region V—Chairman Gail E. Barrand—University of Wisconsin
Marquette
University of Minnesota
Mayo Clinic
University of Michigan
University of Colorado
University of Wisconsin
San Juan, P. R.

Region VI—Editor Ronald E. Bell—Children's Hospital
Childrens Hospital
University of Southern California
University of California
College of Medical Evangelists
Stanford University
Letterman Army Hospital (May-Sept.)

Student Editor—Audrey Haugaard

This month we thank Ronald Bell, Student Editor of Region VI, and the authors of the following articles for their efforts in presenting this material to our readers.

AUDREY HAUGAARD
Student Editor

Postoperative Physical Therapy for Tuberculosis Patients

As students, our experience with chest surgery has been concerned chiefly with patients suffering from tuberculosis. The postoperative condition in these cases may present problems which depend on physical therapy for their prevention or correction.

It was not until around 1919 that pneumothorax was introduced as the first active form of treatment for tuberculosis other than bed rest. Pneumothorax produced inactivation of the lung and allowed complete or partial closing of tuberculous cavities making metabolic repair possible. These patients, however, developed fluid, and consequently fibrous masses in the pleural cavity led to difficult complications. In 1943 pneumoperitoneum was recommended as a more favorable treatment and was combined, in many cases, with a phrenic crush to allow even further distention of the diaphragm into the thorax. Streptomycin for tuberculosis was introduced in 1946. This cured some of the acute cases, but was relatively ineffective against chronic tuberculosis due to the rapidly acquired resistance of the tubercle bacilli. However, by combining paraminosalycylic acid with streptomycin this resistance was prevented in many cases. In 1951 isoniazid or INH proved as dramatic a treatment as streptomycin but it also needed assistance from PAS or streptomycin to prevent the resistance factor.

Various surgical procedures have proven effective for collapse of lung tissue or for removal of diseased areas in the lung. Recently thoracoplasty has been used for collapsing the lung, avoiding the complications of pneumothorax. When portions of diseased lung are removed the procedures are classified as wedge resections, segmental resections, lobectomies or, in fewer cases, pneumonectomies. These surgical procedures leave patients in need of physical therapy.

Of immediate concern after chest surgery is the prevention of atelectasis. Secretions of fluid, exudates and blood clots are usually present in the lung tissue following chest surgery. If these are not removed, atelectasis will occur; therefore, the patient is made aware that

he must cough up these secretions which may form plugs in the lung tissue. In most cases these patients are encouraged to force fluids postoperatively due to their dehydrated condition. Dehydration in this case causes thickening of the pulmonary secretions. Resections of lung tissue are most often made by entering the fourth through the eighth interspace of the thorax using a side approach. Depending upon the extent and method of surgical procedure this usually results in the division of the lower portions of the trapezius and rhomboid muscles, complete division of the latissimus dorsi, and partial division of the serratus anterior. In most cases, these are the muscles which will present postoperative problems.

Gentle range of motion is started as soon as the patient is sufficiently aware of what is happening. He is encouraged to use the arm as well as he can and to position it correctly when resting. Any reasonably comfortable position may be assumed but care is taken to prevent constant positioning in adduction and inward rotation. Ambulation may be started the first day in many cases. After the stitches have been removed the incision is massaged lightly with mineral oil containing lanolin to prevent adhesions and to relax any muscle spasm that may be present.

Thoracoplasties often present unique postural problems. The shoulder of the collapsed side may be carried high and forward, accompanied by a rotation of the seventh cervical vertebrae. The opposite hip may also be carried in a forward position. These postural difficulties should be watched for, and prevented or corrected if possible. Stretching of the latissimus and pectoralis major on the affected side may become necessary to maintain good range of motion.

Preoperative instruction is given to the patient regarding the pain which will be encountered, difficulty and necessity for coughing, and the importance of relaxation and of regaining range of motion as soon as possible.

In all cases the physical therapist relies on the physician's orders concerning all treatment including ambulation, range of motion, and any possible contraindications.

RONALD E. BELL
Children's Hospital
School of Physical Therapy
Class of 1956

Report From Physical Therapy Club University of Southern California

This year we started off under the leadership of the fall president, Robert Loyd. During the summer the returning Seniors planned a welcome for the new students. Bob sent out letters to all of the prospective S. C. physical therapy students telling them how happy we were to have one and all. When registration time arrived, most of the Seniors were right in there introducing themselves, serving refreshments, handing out free advice and showing the lost ones where to go.

The first business taken care of was the electing of the remaining officers, talking up the APTA (nearly 100 per cent student membership), organizing library hours and planning group attendance at football games. We discovered that the Club was (as always) in financial straits, hence a subtle plea for payment of dues.

Five active committees were appointed. Our Press Committee under the leadership of Sara Clark and Kay Martin published and sent out to all our alums and fellow physical therapy departments the "Trojan Therapist." This proved to be a very successful Christmas edition.

The Standards Committee has been working all year to maintain and raise the standards of performance of all physical therapy students.

Each year the current class records the class activities through snapshots. It is the Album Committee's job to collect, organize and post the pictures in the club's album. Shula Slaughter and her committee really did a fine job of portraying the "Spirit of '56."

At homecoming time we joined with the Occupational Therapy Club and built a float which unfortunately soaked up more rain than blue ribbons.

Two other hard working groups were the Alumni and Reorganization Committees. We have never had an active alumni organization. Through Jo Ann McCollum's committee's research on addresses and sending out of letters, a meeting of all alums was called. At this meeting corresponding secretaries from each class were elected. There is now an active alumni organization which we are proud of having had a

small part in helping to organize. The reorganization committee, under the able chairmanship of Joseph Chasin had the unenviable task of suggesting amendments to the Physical Therapy Club Constitution so that the organization might be more streamlined and specific.

Other accomplishments this year were the purchase of a half page in the school annual for a club picture ("trackman" Eugene S. Mondo did the leg work), a tea for the returning clinical training students (what would we do without Mary Ryan—and her coffee urn), a new library in conjunction with the O. T.'s (B. L. Jones, the best organized librarian on campus), and several gala social events.

Altogether this year has been very successful. The club is starting to be used more as the voice of the students in making suggestions to the faculty. It is becoming a more effective instrument in helping the physical therapy students as a group. Those of us who have had the privilege of serving as officers during this year are proud of the progress made. We wholeheartedly thank all members for their contributions to the activities of the Physical Therapy Club and wish as much fun and even more progress to the new class.

VIRGINIA ORTON
President, Spring Semester

Impressions from the Second Congress of the World Confederation for Physical Therapy—June 17-23, 1956

Too bad you missed it! It isn't often that one gets a chance to attend a convention such as the Second Congress of the World Confederation for Physical Therapy. From the lighting of the Congress symbol on Monday, throughout the whole week, we were continually impressed by the events of the Congress. Representatives from 39 countries had come together in New York City to exchange their ideas and to give of their knowledge in a truly international spirit. They thus created a working example of how persons of different backgrounds can work together for a common worthy goal. We lucky students were there and had a chance to absorb some of this spirit and knowledge from an incomparable source!

The Congress was officially opened Monday morning with the Invocation, speeches of welcome, and the lighting of the Congress symbol—a spot-lighted revolving globe. That afternoon there was a panel discussion regarding the role of the physical therapist in the evaluation studies of the poliomyelitis vaccine field trials. Following on subsequent days were sessions concerning the general field of health, the physical therapist and her education and responsibilities, prosthetics, treatment for specific conditions, posture, the community rehabilitation program, and selected testing and evaluation procedures. Friday afternoon brought the final session which stressed expanding opportunities for the World Confederation and cooperation among all member nations. This was followed by the closing ceremony, a brief look at what the Congress had accomplished, a suggestion for future programs, and presentation of newly elected officers. All too soon the Congress symbol was dimmed, and the platform party marched out while more than 2,000 voices sang Auld Lang Syne.

There were many excellent exhibits of the latest equipment, free informational material, and a penthouse film theatre where films of professional interest were shown throughout the day.

Then there was the social program—the reception, the boat trip around Manhattan, the banquet, school reunions, lunches, suppers, and informal get-togethers, in addition to all that New York City can offer visitors.

It was a wonderful experience to participate in this example of international cooperation; and we are all looking forward to the Third Congress in Paris in 1959. Here's hoping we see you there!

THE BOUVÉ-BOSTON SCHOOL
Representation

School of Physical Therapy Produces Color Film

Booked solid since its premiere in March, "This My Life," 16 mm. color sound film produced by the School of Physical Therapy of the College of Medical Evangelists, has received enthusiatic response. Several high school students, after viewing the film, have indicated plans to study physical therapy.

Made possible by a grant from the Birtcher Medical Foundation, the film was directed by a sophomore student in the College's School of Medicine and his wife, Eric and Tanya Tarr. The 23-minute picture is available on loan from the Foundation and the CME Community Relations Office, 1720 Brooklyn Avenue, Los Angeles 33.

Officers and a number of members of the Southern California Chapter of the American Physical Therapy Association were present for the initial showing March 17, on the Los Angeles

Stars and producers of "This My Life." *Seated*, left to right, are Colette Beach Witt, who plays Terri Young, the coed patient in the film; Dr. Fred B. Moor, Director, School of Physical Therapy, and Professor and Chairman, Department of Physical Medicine, School of Medicine, College of Medical Evangelists; and Carol Lowry, who appears as Karen Marsh, the physical therapist. *Standing* are Eric and Tanya Tarr, husband and wife producing team. Eric is a junior in the School of Medicine at the College of Medical Evangelists. Next to Mrs. Tarr is Richard Kuhn, the film's Jim, boy friend of the injured Terri.

Campus of CME. A large attendance necessitated a second showing. Also present were representatives of the Physical Therapy Schools at Children's Hospital and the University of Southern California.

The film depicts the life of a physical therapist who has as her patient a popular university coed with a broken back. The therapist, throughout the film, recalls many of her other patients helped through various procedures of physical therapy.

Report from the University of California

During our nine months of academic study at the University of California School of Physical Therapy we have been fortunate to participate in five extracurricular field trips in the Bay area.

After we completed our unit of study of cerebral palsy, we visited the Cerebral Palsy School located on the grounds of State College in San Francisco. This resident school takes about 30 children for evaluation studies. After remaining at the school for a period varying from 3 to 12 months, these youngsters are returned to their own communities for placement in a facility best suited to their individual needs. Mrs. Marion Haws at the school gave us an opportunity to observe different types of cerebral palsy and explained in some detail the new Bobath method which is now being used in the treatment of several children there.

In conjunction with our studies of poliomyelitis we visited Children's Hospital in San Francisco where there are many cases of post acute poliomyelitis. Mr. Keropian, the chief physical therapist, demonstrated some specific stretches, and also showed us ways of motivating treatment by incorporating pleasure into therapy. For example, the bed of a young girl with scoliosis was placed in a position which forced her to twist her body to see the television screen; thus, unknowingly she stretched the tight side of her back. During Mr. Keropian's demonstration of a respirator, one of our students served as a subject.

We supplemented our studies of amputees with a visit to Oak Knoll Naval Hospital in Oakland. Mr. Jack Low, civilian physical therapist, illustrated correct technics of bandaging, exercises, and gait training. While at the hospital we had an extensive tour through the Physical and Occu-

pational Therapy Departments and through the prosthetic plant.

At the Huck Brace Shop we again observed the various stages of prosthetic manufacture. Mr. Ned Snygg showed us artificial legs and arms, cosmetic hands, functional hooks, and upper and lower extremity braces.

The University of California has a unique affiliation with the May T. Morrison Rehabilitation Center. For one week Miss Ruth Cook gave us lectures on the following subjects: the philosophy, development, and application of rehabilitation; functional activity testing; bracing and adaptive equipment for upper and lower extremities; rehabilitation aims; the role of the physical therapist; and methods of integration in the field. We also spent three afternoons during that week at the center. We learned the principles and technics of teaching activities of daily living including rolling over in bed, dressing, wheel chair management, crutch to toilet and back, ascending and descending curbs, and falling. The week was an interesting experience, and we are indebted to the center for giving us this instruction. All in all these experiences have been invaluable in providing us with a broader perspective in our course of study.

MRS. ELISE A. STONE
University of California at San Francisco
Class of 1956

Report from Stanford University

During the clinical training period of the program in physical therapy at Stanford, each student works out an original project which interests him and which he feels may be a contribution to others in the field of physical therapy.

Our class has chosen the following articles as representative of the various types of projects which have been completed this year. We enjoyed working on them and hope that you will also find them of interest.

SUZANNE ZIEGLER
JOANNE MARINI,
Class Representatives, 1956

Devised Equipment for Exercise of the Abdominal Muscles

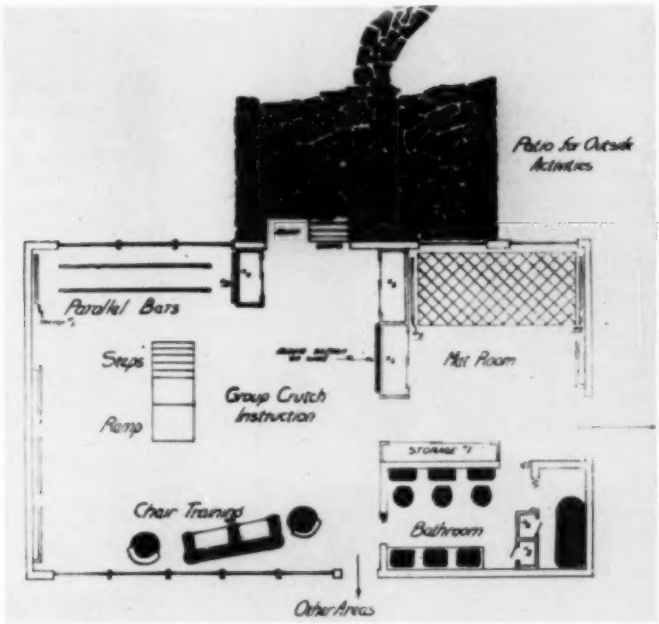
The exercise program of a poliomyelitis patient, who had weakness of the abdominal muscles, included sit-ups from a half-sitting position—a position achieved by the use of a mound of pillows and one large roll. The pillows slipped easily so that it was difficult for the patient to come to a sitting position. Though the same number of pillows was used each time, the arrangement varied so that neither the patient nor I could tell if some days she was doing better, or if the pillows were stacked more to her advantage. It was for this simple but frustrating situation that I devised this equipment.

Adjustable beach backrest

A beach back rest, purchased at any lawn furniture store or department, for $1.50 to $2.00, was backed with a piece of ¼ inch plywood ($.42) for extra stability. The space between the canvas of the back rest and the plywood was filled in with corrugated cardboard (no cost). Originally there were three holes in the rest which varied the angle of the back. By drilling extra holes at regular intervals, a finer grading of the incline was possible. The key mounted on the back of the rest indicated the angles of inclination from the horizontal (completely supine).

If used to supplement a standard muscle test, this device can help the patient who is gaining in abdominal strength to visualize his progress. Since the inclined back gives consistent support to the patient it is better than assistance from the physical therapist who cannot make such assistance consistent. This equipment is, I realize, similar to part of a complete Elgin table. However, for the small hospital department without extensive equipment, this inexpensive apparatus might be useful. Also, the cost is so low that it would be practical for home exercise.

ROSALIE SMITH



Gait training and mat room

Floor Plan of a Room for Gait Training and Mat Exercises

This room was designed for single or group instruction. From the archway, activities taking place on both sides can be seen.

In the largest area, space has been provided for different types of activities. The steps and ramp in the center can be moved aside for group crutch instruction or to show movies of educational activities. The parallel bars have mirrors at both ends in order that the patient may observe his progress.

The bathroom has folding doors, leading from both areas, which are wide enough to admit wheel chairs.

The patio is used for outside training activities and a car may be parked there. The door to the patio has both a ramp and steps through which both ambulatory or nonambulatory patients may enter the department. These also may be used for training purposes.

The mirrors in the plan are identified by numbers which are underlined; numbers for the storage areas are not underlined.

JUAQUINA HILLSTROM

Cervical Traction Sling

Problem

To design a traction apparatus for the home that requires a minimum amount of weight and can be adjusted by the patient.

Equipment

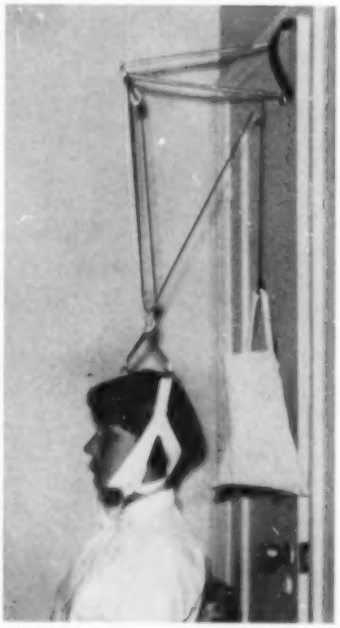
Strong nylon cord—10 feet in length	$ .50
Canvas bag with a sewn canvas handle —8 x 12 inches	2.50
One double pulley—¾ inch	.30
Two single pulleys—½ inch, $.30 each	.60
Head spreader	1.50
Canvas head sling	6.50
Steel apparatus for attachment of pulleys	6.00

Metal clamp used as stop on cord

Weights—1, 2, or 3 pound salmon weights or Elgin aluminum weights (can be attached to a metal ring on rope) or a 1 or 2 pound can of coffee can be placed in canvas bag.

Procedure

1. Fasten either metal holder or piece of wood to door and attach two single pul-



Head traction apparatus applied for use

leys as far apart as possible, up to a foot and not less than half a foot.

2. Attach nylon cord (by square knot) to either metal ring or canvas bag.
3. Put the cord through the pulley closest to the wall and suspend the bag.
4. String the cord through the double pulley on either side and thread up through the single pulley farther from the wall and then continue back down through the other side of the double pulley and up again knotting the cord near the single pulley farther from the wall on either metal or wood piece.
5. Cut off a 6 inch piece of nylon cord or heavy twine and knot the highest part of the head spreader in the groove. If the bag is hanging the same distance from the metal piece as the double pulley is hanging, the remaining cord is divided 5 ways.
6. Sit in the chair facing mirror after putting on the head sling and test it by pulling upward. Because of the 6 inch distance from the first and second pulley you can reach behind, since no pressure is applied until the weight is put in the bag. Now drop the weight in the bag. If you use the metal clamp you can put it on the double pulley side of the first pulley and then put in the weights. Standing, adjust the head sling and spreader. Hold the cord after releasing the clamp and sit down.
7. When sitting in the chair be sure you are in the correct position. Since you have a 6 inch leeway the weights will not hit you in the head.
8. When you wish to get up, reach up for the cord and release the pressure. Put on clamp or take out weights.

NOTE: The pulley ratio is slightly less than 4:1, ignoring friction, as one of the supporting strands is at an angle to the other three. (The angle of this strand as shown is 30°; thus the pull exerted would be 1 cos. 30° or .866 lbs.)

HELEN MCCUSKER

Veterans Administration Research Program

A broader attack upon the "unknown" in man's major diseases will be started immediately by Veterans Administration.

An enlarged medical research program will be conducted with the $10,000,000 appropriated by Congress for the fiscal year 1957, beginning July 1, 1956—$4,300,000 more than was appropriated last year.

Most of the increased medical research will be concentrated in four areas of major diseases: 1. mental, nervous, and brain diseases (neuropsychiatric); 2. heart and artery diseases (cardiovascular); 3. cancer and leukemia; and 4. problems of aging (geriatrics).

The VA also will expand its research program in tuberculosis, in the fungus diseases which resemble tuberculosis, and in the infectious diseases.

In addition renewed emphasis will be placed on individual research projects, such as the isolation and identification of the factors which produce man's greatest killer, hypertension or high blood pressure; the cause and nature of hardening arteries (arteriosclerosis); the cause and nature of tissue changes (metabolic diseases); and the brain areas where epilepsy and related nervous disorders originate.

Cooperative drug (chemotherapy) studies will be continued or instituted with the new available funds, VA said. They are:

1. The chemotherapy of multiple sclerosis for which no known cure is available,
2. The chemotherapy of psychiatric disorders, with special emphasis on the new tranquilizer drugs,
3. A cooperative study of the treatment of hypertension, or high blood pressure, with special reference to the use of newer drugs,
4. The chemotherapy of cancer, co-sponsored by the U. S. Public Health Service, the American Cancer Society, and the U. S. Atomic Energy Commission.

In all of these studies, VA will be advised by the National Research Council Committee on Veterans Problems, the Statistical Agency of the National Research Council, and the Advisory Committee in Research of VA composed of outstanding leaders in American medicine who review the medical research programs in their own fields of specialization.

VA said its close affiliation with 74 medical schools permits it to profit by the experience and resources of the outstanding scientists in those institutions who work with, and lend support to, the VA medical care program.

The medical schools through their Deans' Committees supervise VA research programs and actively participate in the training of VA researchers.

This program of cooperation and collaboration will be continued in the enlarged medical activities to provide better care for veterans and, indirectly, for people throughout the world.

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Editor's Note.—Because of recent elections and address changes received after the Chapter Directory was prepared for publication in the October *Review*, the Directory has been repeated in this issue with the latest information. The Chapter Directory will appear again in the spring of 1957.

Publicity Material Is Needed

There is a great need in the National office for "special interest" story material on physical therapists to enable us to fill the frequent requests we receive for magazine and newspaper articles and radio and TV scripts. In order to take advantage of these many opportunities for publicity we must have a file literally bulging with story material on physical therapists.

Your cooperation in sending us background material—perhaps brief outlines of one or more incidents in your daily professional work with patients or in your teaching or research—will make it possible for us to get more and better publicity. The incidents should interestingly, dramatically, and briefly illustrate the rewards and challenges in physical therapy.

Help Replenish our Photograph File

We appeal to each member of the APTA to survey your institute's files and let us have prints of all photographs which can be released for our use. It would be very helpful, too, if you would check the publicity directors of the agencies in your area which use the services of physical therapists, the National Society for Crippled Children and Adults, National Foundation for Infantile Paralysis, United Cerebral Palsy, etc., and ask them whether they have any photography showing physical therapists in clinical, teaching, or research situations which we might use in our recruitment program.

If the releases for some photographs which you think will be effective in our publicity do not permit their reproduction perhaps you can obtain permission for their use in our exhibits.

Directory for Exceptional Children

The second edition of the *Directory for Exceptional Children* was published on October 1, 1956. The contents include lists of day and state schools and boarding homes for the mentally retarded; schools for the socially maladjusted and emotionally disturbed; boarding and day facilities for the orthopedically handicapped and cerebral palsied; schools for the blind, deaf, and speech handicapped; clinics and associations concerned with problems of the handicapped; state programs and personnel.

The directory is edited by E. Nelson Hayes. Further information may be obtained from the publisher, Porter Sargent, 11 Beacon Street, Boston 8, Massachusetts.

Proceedings of Second Congress

All papers given at the Second Congress of the World Confederation for Physical Therapy will be bound in a single volume to be available no later than January 1, 1957. The *Proceedings* can be ordered from the American Physical Therapy Association, 1790 Broadway, New York 19, New York, at $3.00 a copy. (For shipment outside the United States add 25 cents for postage.)

Abstracts

Editor's Note.—In the future, as a service to our readers, abstracts will carry the author's address. Please do not write to the *Review* regarding reprints. Only the author can furnish information as to their availability.

Mobile Home Treatment Unit for Rheumatism and Arthritis

T. F. Hines, G. K. Deforest, and E. L. Nyman, Grace-New Haven Hospital, New Haven, Connecticut, BRIT. J. PHYS. MED., 19: 145-147, July 1956

The organizational plans for the Mobile Physical Therapy Home Treatment Unit in the Yale-New Haven Medical Center are described in this article. There was a need for such a unit for the severely involved patient with rheumatoid arthritis. The cost of long periods of hospitalization was usually prohibitive. Transportation for outpatient treatment was impossible or contraindicated. On the other hand, simply remaining at rest at home or in bed was producing, in many cases, contractures and increasing loss of muscle strength. Thus, it was felt that a home treatment unit would bridge the gap between hospitalization and outpatient care.

Physical therapy was provided by the Department of Physical Medicine and Rehabilitation of the Yale-New Haven Medical Center. Physical therapists were rotated from this department on a three months' basis. With this plan it was felt that they could obtain better physical results and avoid patient-therapist dependence. It was also felt that one physical therapist would not be subjected to the very severely involved patients over a long period of time as this can be discouraging to the patient as well as to the physical therapist. All therapy was prescribed by the physician of the Arthritis Clinic.

The equipment for the mobile unit was underwritten by the Connecticut Chapter of the Arthritis and Rheumatism Foundation. This consisted basically of Hydrocollator steam packs, footdrop boot, weights for progressive resistance exercise, adjustable aluminum cane and crutches, bed board, electric baker, cervical and leg traction outfits.

One of the most important parts of this program is that of teaching the patient and his family to carry out the treatment on their own. These severely involved patients require lengthy treatments; therefore, relatively few patients can be treated per day.

It is felt that the results so far have justified the formation of the Mobile Home Treatment Unit. The cost of treatment and the various ways in which this cost is met are discussed. Plans have been made to publish treatment routines in the future. It is believed that this plan can be applied equally well to other severely disabling conditions such as poliomyelitis, cerebral palsy, multiple sclerosis, muscular dystrophy and severe injuries.

(This article was published simultaneously in the July issue of the Conn. State Med. J.)

Prevention of Falls in the Hemiplegic Patient

Mieczyslaw Peszczynski, Geriatrics, 11: 306-311, July 1956

Hemiplegic patients fall much more frequently than other elderly people. This is becoming a serious problem in the rehabilitation of these patients. There are four groups of intrinsic factors which may increase the falling hazard in the hemiplegic patient: 1) disturbances in circulation, 2) impairment of righting reflexes, 3) changes in motor function, and 4) sensory involvement.

Examination of the reflexes governing adjustment of peripheral circulatory system during a change of body position are essential. To insure safety, the physical therapist should advise all patients to get up from bed gradually. They should first sit up and wait; then stand up, hold to the bed, and wait again; and, then only, attempt to walk.

In the elderly hemiplegic patient, many postural reflexes are impaired. During training and in planning for the future this should be kept in mind. Such a patient easily loses control of the upright position, while stretching his neck as in reaching for something on a high shelf, or while turning his head sharply to right or left as in reaching for objects behind him. The patient should be advised to arrange his living quarters in such a way that he does not have to place objects on high shelves or hang clothes on high racks.

A small percentage of hemiplegic patients lean heavily toward the affected side. Patients must learn to disregard their faulty impression of their position in space and learn to lean to the good side.

When the hemiplegic patient puts weight on the involved leg, he may not be able to relax spastic calf muscles and may have a tendency to fall backward. This may be avoided by external rotation of the involved foot or by slight trunk flexion.

Many patients with flaccidity of the lower extremity learn to walk with a short leg brace. The intermittent double step gait in which the patient steps with the involved leg, then the good, and then stops, is used to help patients maintain balance.

Clinical experience has shown that if someone passes close to the unaffected side, the more severely involved hemiplegic patient has a tendency to fall toward his affected side. Turning the head, as well as a lack of perception regarding the position of objects may cause the patient to fall. To avoid accidents the patient may be taught to stop whenever a person is going to pass him, and to lean still more toward the good side, at the same time concentrating on maintenance of steady balance.

A person familiar with gait training of severely involved hemiplegic patients will learn quickly, from a short observation of a new patient, the most likely reasons why this particular person may fall. Gait training should include adequate preventive measures and protective habits to be continued when independence is achieved.

The Pathology of Ischemia of Skeletal Muscle in Man: A Description of the Early Changes in Muscles of the Extremities Following Damage to Major Peripheral Arteries on the Battlefield

Robert E. Scully and Carl W. Hughes, AM. J. PATH., 32: 805-830, July-Aug. 1956

The early pathologic changes in skeletal muscle following damage to major arteries of limbs were studied in 30 soldiers, most of whom had sustained injuries on the Korean battlefields. The material consisted of biopsy specimens, surgically excised necrotic muscles, and amputated limbs. The specimens were obtained from 6½ hours to 26 days after injury.

The pathologic lesions observed paralleled those described in experimental muscle ischemia and appeared to be the logical forerunners of later changes reported in humans.

Swelling of ischemic muscles following restoration of circulation occurred in several cases. The nature and pathogenesis of this swelling was not evident from study of human or experimental data.

After the acute phase of ischemia had passed, the muscles studied fell into one of four pathologic categories: (1) more or less complete necrosis; (2) patchy, but extensive necrosis with inflammation and repair; (3) severe damage of fibers, but survival of stroma and widespread muscle regeneration; and (4) normal structure.

A pale yellow or cream color, probably attributable to loss of myoglobin, was an outstanding feature of several muscles in category 3 as well as in category 2. Therefore, depigmentation is not a reliable criterion of irreversible damage in ischemic muscle.

The gastrocnemius muscle fared better than the soleus in the great majority of cases of obstruction of a major artery of the leg. This result was the opposite of that reported in local wounds involving the immediate arteries of supply of the muscles. The vascular anatomical background for this disparity was not clear. Because of the difference in outcome of the two muscles, it is apparent that the condition of the gastrocnemius cannot be used as a guide to that of other muscles of the leg.

Gamma Control of Dynamic Properties of Muscle Spindles

Ragnar Granit and H. D. Henatsch, Nobel Institute for Neurophysiology, Karolinska Institutet, Stockholm 60, Sweden. J. NEUROPHYSIOL., 19: 356-366, July 1956

Sensory endings in the muscle fibers and tendons called muscle spindles respond to the intensity and rate of stimulation. Spindle firing is begun by a dynamic potential recordable in the sensory terminals as a rapid depolarization which afterwards quickly subsides to a semistationary level. The present study is to determine if the gamma innervation in the tegmental portion of the brain stem is also capable of controlling the dynamic properties of the spindles.

Spindle afferents were isolated in the S_1-L_7 dorsal roots of anesthetized cats and rabbits and were attached to the strain gauge myograph. The hindlimbs were also denervated, except for the nerves to the gastrocnemius and soleus muscles. The tegmental portion of the brain stem was exposed. The gastrocnemius muscle and tendon spindles were stimulated by a Goodman vibrator and the rate of vibration recorded.

The results demonstrated that gamma activation by stimulation in the brain stem did effect the response of the spindles. The spindle activated by gamma impulses responded to faster rates of vibration than when there was no gamma discharge. Less amplitude of the vibrating oscillation on the spindle was also required. Lack of gamma activation could be compensated for by increased stretch of the muscle.

The animal has then a means, gamma control from the brain stem, which adds to the sensitivity and usefulness of the sensory end organs to adjust to fast and slow acts and to coarse and delicate movements.

Cervical Spondylosis and Compression of the Spinal Cord

Jackson Braham and Eugene E. Hertzberger, Tel-Hashomer Government Hospital, Tel-Aviv, J. A. M. A., 161: 1560-1563, Aug. 18, 1956

Spondylosis of the cervical vertebrae may give rise to a syndrome of cord compression with a variety of subjective and objective neurological disturbances in the upper and lower limbs.

Indentation of the cervical part of the spinal cord by protrusion of intervertebral disks and by osteophytic lipping produces varied neurological symptoms directly by mechanical injury and indirectly by effects on the movement of blood and cerebrospinal fluid. Diagnosis depends on cerebrospinal fluid manometry and myelography, for the symptoms may have more than one cause.

In one case, the extensive paralyses in the patient were found to result from amyotrophic lateral sclerosis in addition to osteophytes that had caused marked narrowing of the disk space at the fourth and fifth cervical levels. In a second case, gross spondylotic changes in the cervical region coexisted with a sarcoma that was blocking the canal completely in the thoracic region.

Laminectomy, with section of the dentate ligament, was done in six cases of chronic cord compression by cervical spondylosis. No improvement resulted in one case, and in two the results were hard to assess. But in three there was partial success, and two of these patients were relieved of symptoms and enabled to return to their occupations. This experience indicated that surgical treatment should be reserved for the patient in whom the symptoms are recent and rapidly progressing.

An Outbreak of Poliomyelitis

M. L. E. Espir, J. Dominian and W. Ritchie Russell, United Oxford Hospitals, Oxford, London, England. LANCET, No. 6932: 4-7, July 7, 1956

In England the policy is to admit poliomyelitis cases to isolation hospitals, the basic theory being that this will control the spread of the disease throughout the community.

During the years 1952 and 1955, a combined total of 118 polio patients were treated at the Stokes Mandeville Hospital. Facilities for treatment were not specifically geared to polio. Patients were, at first, observed in cubicles, reserved for isolation, until the diagnosis of polio was established. Transference to polio wards was then made and patients were arranged according to nursing requirements regardless of age and sex.

Of chief concern during this time were patients who had difficulty in swallowing but without respiratory distress; those with weakness of the respiratory muscles but without throat weakness; those with a combination of both weaknesses. Treatment included tube feeding, postural changes, tracheotomies; all were used in accordance with the severity of the disability.

Hot packs and splints were not utilized during the acute stages. In lieu of this, body position was changed every 2 to 4 hours, at which time tight muscles were gently stretched. Foot boards and pillows were also used. In all cases, lying prone for 2 to 3 periods every 24 hours was considered an important exercise for the lungs and the muscles of the lower extremities and trunk.

The importance of a trained staff working as one unit is emphasized. Realization of the difficulties encountered in obtaining this goal is also discussed.

Issues in Rehabilitation: Does Rehabilitation Pay?

Georgia France McCoy, Department of Health, Education and Welfare, Washington, D. C. BRIT. J. PHYS. MED., 19: 159-162, July 1956

In finding an answer to the question of whether or not rehabilitation pays, the first issue discussed is the validity of the problem of disability itself. Is it of sufficient extent and gravity to demand the social and economic effort needed to meet it by positive methods? In the United States it has been estimated that at least two million handicapped persons could benefit from rehabilitation services. It is further estimated that a quarter of a million persons are added to this group each year. The total number actually rehabilitated each year is well under 100,000, therefore it is clear that the yearly increment to the number of disabled is greater than the yearly decrement by rehabilitation and death. The problem of disability is, therefore, an accumulative one of great magnitude. The cost of public assistance to people dependent because of disability is tremendous and this is not the total cost. It also includes the even greater loss of the potential production and service of this group to society, the incalculable misery arising from disability, lost opportunity for development of personal capacities, and the personal and private losses to the individual families involved.

The second issue which arises is the feasibility of rehabilitation. Growing facts provide conclusive evidence that even the most severely handicapped can learn to use what remains to them.

Is the expense of rehabilitation then worthwhile? Two kinds of value are considered in answering this main question: first the economic value in terms of tangible money returns, and second, the more intangible social and humanitarian value. Public and private agencies have made a number of reports on rehabilitation activities and their results. Figures from many of these reports are listed and they prove that rehabilitation does pay, both for productive work, and for "self-care."

In addition to economic benefits, there are also the gains to the individual in terms of restored dignity and general well being, personal freedom, plus the effect on the morale of the person's whole family, his community, and the general public. There is real psychological relief in seeing a handicapped person able to handle his own problems. This paper ends with the fact that experience is proving more and more that maximum benefit from rehabilitation depends on the social support, including economic opportunity, that the community provides for those who have been rehabilitated.

Environmental Support in Long-Term Illness

Robert P. Smith, Massachusetts General Hospital, Boston, J.A.M.A., 161: 836-839, June 30, 1956

Chronic illness tends to promote a dependency on the hospital and community requiring a real need for practical ways to get the patient back into the community. Too often for the chronically ill person, community relationships become lost, and the patient feels no longer needed on the job, in the community, and sometimes even in the home. From the start special efforts must be made to build up a reserve of family and community participation in planning for the patient's return to a full and useful life.

Responsibility for the long term program rests on the family doctor. He can direct the efforts of social service in exploring the home environment and keeping in close contact with the family. Other sources of support in the community may be visiting nurses associations; home care programs of physical and occupational therapy; public assistance officials; employers; and fellow-members of clubs or other organizations. The team which helps a patient get away from his dependent role in the hospital may be likened to a board of directors, who supply him with counsel, encouragement, and information, but who expect the patient to make his own decisions.

One should also take account of the tremendous untapped resources of the human body. Often there are other areas which can take over for an injured part. Many patients carry with them abilities and qualities which have never been drawn upon. Because no one person can devote all the time and energy necessary to provide assistance for the dependent patient, there is need to call on resources in the community to help with this all important aspect in the rehabilitation of the chronically ill.

Effect of Pain on Simultaneous Perception of Non-Painful Sensory Stimulation

F. A. Benjamin, J. APPL. PHYSIOL., 8: 630-634, May 1956

This study was undertaken to determine whether the presence of pain has any effect on the threshold of other sensations and, if so, whether such an interaction might bear a relation to the pain intensity. Experimental pain was produced: a) by production of ischemia in the arm by means of a pressure cuff on the upper arm; b) by the pressure of a rubber-sleeved hemostat on the interdigital skin; c) by introcutaneous injection of 5 per cent saline solution. Clinical pain was studied by comparing dental patients with and without pain.

It was found that all types of pain tested increased the thresholds of hearing, vision, vibration and of heat sensation. The mean threshold raising effect was generally proportional to the intensity of pain. The interference pattern was least pronounced in trained investigators, greater in medical students, while clinical patients showed it most markedly.

It was concluded that the sensory interference in the presence of pain corresponds to the actual pain at the time of testing. However, the feeling of pain at the time of testing depends not only on the intensity of the painful stimulus but also in a negative way on the cognitive disposition of the subject, i.e., his willingness and ability to concentrate on the test.

The Action of Adrenaline on Muscle Blood Flow and Blood Lactate in Man

H. Barcroft and A. F. Cobbold, Sherrington School of Physiology, St. Thomas Hospital, London, J. PHYSIOL., 132: 372-378, May 1956

Simultaneous determinations of the rate of the blood flow in the forearm and arm and of the lactate content of the venous affluent blood from the forearm muscles were made before, during, and after intravenous infusions of adrenaline.

During the infusions there was a large transient vasodilatation followed by a smaller sustained vasodilatation. After the infusions the blood flow decreased abruptly at

first and then subsided gradually to approach the initial level in about half an hour.

Muscle blood lactate did not change significantly during the transient dilatation. During the sustained vasodilatation it increased progressively. Following the infusion it subsided gradually, reaching the preinfusion level in about half an hour.

These results were discussed, and it was suggested that the sustained vasodilatation may be caused in part by products of muscle carbohydrate metabolism.

Experiences With More Than One Thousand Elderly Surgical Patients

Jean Limbosch, Schaerbeek Hospital, Brussels, Belgium, ARCH. SURG., 73: 124-132, July 1956

With the increased life expectancy, improvements in surgery, medications and anesthesia, surgery for the elderly patient is proving more desirable and successful.

This series covers all of the 1,136 patients, ranging from 70 to 93 years of age, admitted to the general surgery wards between 1945 and 1953 at Schaerbeek Hospital. The patients on the surgery service were admitted with a variety of problems—trauma and cancer totalling over 50 per cent of the cases.

There were 481 operations performed. Of these 145 were minor operations without mortality and 336 were major operations after which 20.5 per cent of the patients died within 30 days postoperatively. The mortality rate of the planned operations was 16.6 per cent. This is higher than in the younger age group but not alarming. Gastrectomy for chronic peptic ulcers had most gratifying results. Emergency operations were primarily abdominal surgery. Results in these patients could have been more successful with earlier diagnosis and treatment.

The consideration of surgical risk will always be greater in the elderly patient. Elderly people stand shock and hemorrhage badly, thus good surgical technic and anesthesia is essential. Pre- and postoperative electrolyte metabolism is important. Cardiovascular and pulmonary complications increase the surgical risk, but were less in this series than other studies, perhaps due to routine use of correct antibiotics and anticoagulants.

The results of surgery in older people can be successful. Early diagnosis and treatment and the prevention of postoperative complications are essential.

Surgical Occlusion of Anterior Choroidal Arteries in Parkinsonism.

Robert W. Rand, W. Jann Brown and W. Eugene Stone, NEUROLOGY, 6: 390-401, June 1956

This article discusses the clinical and neuropathological observations of 5 patients with Parkinson's disease before and after the surgical occlusion of the anterior choroidal artery.

All 5 patients were males whose ages varied from 44 to 60 years. They had had parkinsonism for many years with mild to severe rigidity and alternating tremor. Three patients were postencephalitic, the fourth had a history of syphilis and the fifth had an idiopathic process.

There were 6 operations, 1 patient having bilateral surgery. The anterior choroidal artery was exposed by way of a temporal osteoplastic craniotomy and occluded.

In 4 patients the alternating tremor ceased contralaterally immediately after the occlusion but returned to its preoperative intensity within 2 weeks. The rigidity was only temporarily lessened in the 3 postencephalitic cases but perhaps permanently in the other 2 cases. Other than rigidity and tremor, the symptoms of parkinsonism were not affected. Two patients had some residual visual difficulty. Two patients have died subsequently of pneumonia.

The disappointing clinical results in these 5 cases may be attributed to failure to produce the appropriate surgical lesion. More consideration of variable circulatory and "recircuiting" factors is indicated.

Effects of Calcium Deficiency on Striated Muscle of the Frog

E. Bülbring, M. Holman and H. Lüllmann, J. PHYSIOL., 133: 101-117, July 1956

The behavior of isolated frog's skeletal muscle in calcium-deficient medium was investigated and reported in this paper.

Lowering the Ca^{2+} to one-twentieth of the normal amount led to a fall in membrane potential and a greater scatter of the values measured. The muscle became rhythmically active. Lowering of both Ca^{2+} and K^{+} to one-twentieth of the normal amount caused a greater scatter both above and below the normal values. Spontaneous rhythmic activity began at a time when the mean resting potential was still normal. Later the membrane potential slowly declined.

As a result of calcium deficiency the membrane potential became unstable and fluctuated. Slow waves appeared which grew in size until they gave rise to action potentials. The appearance of the action potential was normal, or, as the resting potential fell, it was preceded by a slow depolarization which suddenly deflected into the rapid rising phase of the spike potential. The frequency of discharge of spike potentials was related to the resting potential: at a high membrane potential the rate was slow, at a low potential the rate was fast.

The size of the action potentials varied from the normal size with reversal of the membrane potential, to small spikes which reached only a partial depolarization.

Within a small range of stretch a graded increase in tension was accompanied by a graded increase in the rate of spike discharge and muscle twitches.

The rate of activity of calcium-deficient striated muscle was increased by histamine.

External stimuli not only increased the rate of activity but often produced synchronization.

When Physical Therapy (Shock) Facilitates Psychotherapy

Lewis B. Hill and John D. Patton, Sheppard and Enock Pratt Hospital, Towson 4, Md., AM. J. PSYCHIAT., 113: 60-65, July 1956

Considered functionally psychosis is an escape from unendurable situations. The nature of the illness imposes severe obstacles and disabilities in the pursuit of psychotherapeutic goals. The patient wishes to recover, but is unable to endure the pain and humiliation of his life situation.

Psychotherapy is a time-consuming procedure. The financial and social demands for the patient to return to his home, community, and

job as soon as possible pose a real problem. If therapy needs to be continued for years the patient loses hope, faith, and self-esteem.

Psychotherapy is effective only insofar as there is rapport between some healthy ego of patient and therapist. There are many psychotic blocks that sabotage psychotherapy including denial of reality.

Skillful psychotherapy may be more successful and hasten the patient's recovery with the additional treatment of physical therapies (electroshock or insulin shock therapies). Combined psychotherapy and shock therapy may break up the massive and destructive psychotic resistance so the patient and therapist can work together profitably. Shock therapy should not be used alone and the timing of its use is very important. It should be used after some patient-therapist rapport has been established, but before the patient and therapist lose hope. Electroshock therapy is generally used in the manic depressive or paranoid patient. These patients usually do not respond to psychotherapy alone and while some amnesia follows shock therapy, it is usually selective. Shock therapy does not make the patient appreciably less available for psychotherapy.

Four case histories are presented to demonstrate the combined use and success of shock therapy and psychotherapy.

Fractures of the Ankle: VI. Follow-Up Studies

T. Baek Kristensen, Bogense, Denmark, ARCH. SURG., 73: 112-121, July 1956

Patients who had malleolar fractures were treated with the Lange-Hansen technic of closed reduction and immobilization. This technic is discussed. In the present series of follow-up comparison, 194 adult male and female patients were compared with a control group of 197 patients whose fractures had been treated by various other methods of open and closed reduction.

Conclusion of the results were based on subjective report of the patients; clinical examination of position range of motion and gait; and roentgenologic studies. The follow-up studies were made at least 3 years after treatment. The subjective result was described as "good" in patients reporting no pain or mild pain; as "medium" with mild to occasional severe discomfort; and "poor" in which pain and disability had interfered with previous working capacity. The clinical examination was rated as good if gait and motion were essentially normal, as medium or poor depending on limitation of motion and gait. The roentgenologic results were classed as good if there was only a slight (2mm) dorsal displacement of the lateral malleolus or an anterior displacement of the medial malleolus. More than 2mm. displacement was classified as medium or poor. Also if there were any displacement of the talus the result or x ray was considered poor.

In general the Lange-Hansen method of reduction proved successful. For example, in 77 cases with poor position before reduction, including displacement of the talus, 58 had good reduction, 11 medium, and 8 poor with the Lange-Hansen technic. Other methods of reducing 76 severe fractures yielded 15 good, 23 medium, and 38 poor reductions. A similar comparison was evident on follow-up.

Clinically and subjectively the follow-up results were favorable to the new method of treatment, especially in the more severe fractures. In the patients who had poor pre-reduction fractures, 70 per cent showed good subjective and clinical results while 42 per cent had good results in the control series.

Abstractors for November

Again we wish to express our appreciation for those who have assisted in the preparation of abstracts during the past months and to Jean Cuthbertson and Margot Trimble for their contributions to this issue of the *Review*.

Book Reviews . . . . .

Artificial Limbs. Review of Current Developments. Volume 2: Number 3. *By Advisory Committee on Artificial Limbs, National Research Council. Edited by Bryson Fleer, A. Bennett Wilson, Jr. and F. S. Strong, Jr. Contributing authors are Craig L. Taylor, Ph.D., Professor of Engineering, University of California, Los Angeles; John Lyman, Assistant Professor of Engineering, University of California, Los Angeles; Robert J. Pursley, Lt., USA (MSC), Chief, Research Limb Section, Army Prosthetics Research Laboratory, Walter Reed Army Medical Center, Washington, D. C. Paper. No charge. Pp. 70; illus. National Academy of Science, Washington, D. C. Sept. 1955.*

The three authors are eminent in the field of prosthetics and have contributed previously to the literature; two detailed articles by Dr. Taylor appearing in the book, *Human Limbs and Their Substitutes.*

Artificial Limbs is a magazine-type publication issued three times a year; in January, May, and September. It provides a concise review of current developments in prosthetics.

The articles included in this issue are all concerned with control and harnessing problems and how they are best solved at present. All of the articles keep in view the goal of producing a prosthesis that will enable each amputee to function to his maximum. The authors state that no matter how much improvement may be made in the future in regard to upper extremity prostheses, the actual use the amputee can make of his prosthesis will always depend upon how well the fitter has adapted the component parts available to the patient's structure, temperament, and abilities.

The section on "Biomechanics of Control in Upper Extremity Prostheses" gives a description of surface landmarks, how measurements are made, functional and descriptive anatomy, and the mechanics of joint motion as well as the functional role of the various types of sockets.

The article on "Harness Patterns for Upper-Extremity Prostheses" contains the clearest explanation of the whys and wherefores of harnessing that I have encountered. The drawings are easily understood and well marked. There is a section on harnessing for women patients, upon which little has been written previously, and a good harness reference chart which includes the advantages and disadvantages of each type of harness.

The last article concerns case studies of harnessing for extreme arm amputation cases and shows what it is possible to accomplish in these instances.

All of the information has been arranged logically for easy reference, and much thought has been given to making the articles as readable and understandable as possible.

Similar information has been presented before, notably in the *Manual of Upper Extremity Prosthetics,*

compiled by the Artificial Limbs Project at the University of California, Los Angeles, and in *Human Limbs and Their Substitutes* prepared under the sponsorship of the Advisory Committee on Artificial Limbs of the National Research Council. These sources, however, are very detailed, whereas this magazine gives a good concise explanation of control and harnessing, making it an excellent manual for doctors, therapists, prosthetists, and amputees themselves. The article on "Harness Patterns for Upper-Extremity Prostheses" is outstanding because of the manner in which the author has drawn together the relationship of amputee, control system, and harness.

Cerebral Palsy. Advances in Understanding and Care. *By Viola E. Cardwell, M. A. Cloth; price $5.00. Pp. 609; illus. Association For The Aid of Crippled Children, New York 1956.*

The author of this detailed approach to the problems of cerebral palsy is familiar to many of those interested in this field through her excellent book on *The Cerebral Palsied Child and His Care in the Home.* In her new book, Mrs. Cardwell gives to her readers a more expanded picture of the many facets which must be tapped in order to cope realistically, intelligently, and humanely with the problems of the patient, his family, and the community. She portrays vividly the necessity for the team approach which includes physicians, therapists, psychiatrists, psychologists, educators, social workers, vocational rehabilitation counselors, lay groups, and consultants of national organizations. Over a thousand references, carefully categorized under specific approaches to the problem, direct the reader's attention to the vast amount of study and research which is going on in this field, for so long a stepchild.

In the first part of the book the medical background of cerebral palsy is presented together with a frank portrayal of the controversies which are in evidence today. Many excellent plates are included in the section on the central nervous system. There is also an exceptionally good chapter on diagnosis. The importance of early recognition of signs and symptoms is stressed not only in this chapter but throughout the book. The author emphasizes that all professional and lay people in a community should be alert for signs and symptoms of cerebral palsy, especially in the very young. In the chapter on "Case Finding" it is reported that many surveys on the incidence of this condition show a surprisingly small number of cases reported in the age group under five. This emphasizes the need for greater effort to be made in locating particularly the infant with cerebral palsy in order that habilitation may be started before bad motor patterns, contractures, and other manifestations of abnormality are firmly established. A very good follow-up program is suggested for "vulnerable" infants, i.e., those whose birth records and histories indicate probability of involvement.

The second part of the book deals with total habilitation and should be read by every professional person dealing with cerebral palsied persons. Here the author gives not a specific treatment approach but rather a deeper understanding of the contributions of the patient, parents, professional team, and lay workers and the importance of correlating and integrating the knowledge and findings of each in total planning for the handicapped person. Physical therapists especially will appreciate the section on developing balance which is described under "Pre-skill Training." The occupational therapists and speech therapists will find many helpful suggestions in the material devoted to their respective interests.

Later on, the findings of psychological surveys, recorded in graphs, give a more realistic conception, than has been presented in the past, of the problems which must be faced in the field of cerebral palsy. An idea which merits comment is that every department in a cerebral palsy unit should have a special record for each child which would state his current weaknesses—physical, mental and/or emotional, what can and cannot be expected of him at the present, and the points at which help is needed. To be useful such a record must be kept up to date.

In part three the community's responsibility is stressed. The most recent reports on the estimated number of cerebral palsied cases in the United States, which vary from 175,000 to 550,000, are well worth studying. With these figures in mind, the part the community can play in the total picture of habilitation, including vocational problems, is discussed at length. This wider viewpoint is often overlooked by the devoted worker who may become so absorbed in his own field that he forgets he is dealing with a person of many facets.

In conclusion, the total approach to the problem of cerebral palsy as described in Mrs. Cardwell's book is so idealistic that it would be almost impossible to achieve because of limitations of time, finances, and trained personnel, as she herself recognizes. Nevertheless, the author has brought to the literature another excellent book which should be a part of the library of every person working with the cerebral palsied.

Annual Review of Physiology. Volume 18. *By Victor E. Hall, Editor, University of California at Los Angeles; Frederick A. Fuhrman, Associate Editor, Stanford University; and Arthur C. Giese, Associate Editor, Stanford University. Cloth; price $7.00. Pp. 591; illus. Annual Reviews, Inc., Stanford, California, 1956.*

The eighteenth volume of the *Annual Review of Physiology* was planned during the International Physiology Congress at Montreal and is truly international in scope. Of the 22 articles in this volume, fully half come from outside the North American continent. The editors have attracted top level people from abroad for these reviews and the result is a volume that not only covers the literature extremely well, but often focuses attention on material that is not generally well known in this country.

Of particular importance for the field of physical therapy is the review on muscle by Feigen of Stanford, California. This reviewer has deviated somewhat from the usual pattern of trying to include as many papers as possible. Instead he has written a selective review of basic muscle physiology which is good in content and makes interesting reading. There is a series of five reviews on the different functions of the nervous system written by English, French, Belgian, Canadian, and American authors. There is also a very excellent review on the physiology of the heart by Schaeffer of Germany.

As in previous volumes of this series, there is a prefatory chapter written by an "elder statesman" of physiology, which this year has been done by Dr. Houssay of Argentina. The field of physiology is indebted

to Dr. Houssay not only for work of such caliber that it has been awarded the Nobel Prize, but also for the inspiration of his uncompromising stand for freedom of research and academic teaching, under circumstances that most of us can hardly imagine. Dr. Houssay writes about the development of research and medical school teaching in Argentina. When he says that "Physiology is the main foundation of modern medicine, because knowledge of normal function is a necessary basis for the understanding and control of functional disturbances caused by disease" he mentions a basic truth that holds for every branch of medicine including our own.

How We Do It Game Book. *Edited by Eleanor Parker King. Paper, loose-leaf; price $2.50; illus. American Association for Health, Physical Education, and Recreation, Washington, D. C. 1956.*

This compilation of games has been made from the many previously described in the "How We Do It" column of the *Journal of the American Association of Health, Physical Education, and Recreation.* It brings together a varied selection of games, some of which are new and others which are conventional, well known games adapted for smaller space or smaller numbers of players. Although this material is presented for general use, it provides an excellent selection of games which can readily be adapted for use with handicapped groups. It should be a useful book for anyone who uses games in a rehabilitation program either for children or adults.

This is an inexpensive book, in loose-leaf format. Additional games in the same format will be published from time to time by the *Journal of the American Association of Health, Physical Education, and Recreation.*

Readings In Disaster Planning For Hospitals. *By Committee on Disaster Planning. Paper; price $.75. Pp. 90; illus. The American Hospital Association, Chicago 1956.*

A collection of articles which covers factually and in detail the preparedness or lack of preparedness and the lessons learned by hospitals and communities in eleven separate major disasters.

Not only is it instructive and holds one's interest throughout the book, but it should be required reading for all persons from high school age on. The reader becomes increasingly aware that the burden of a disaster does not rest alone on the medical profession and the hospital, but can engulf the entire community and adjacent communities.

It is also emphasized that the size of an institution or community and the existing facilities will have no bearing on the role it may be called upon to play in a disaster.

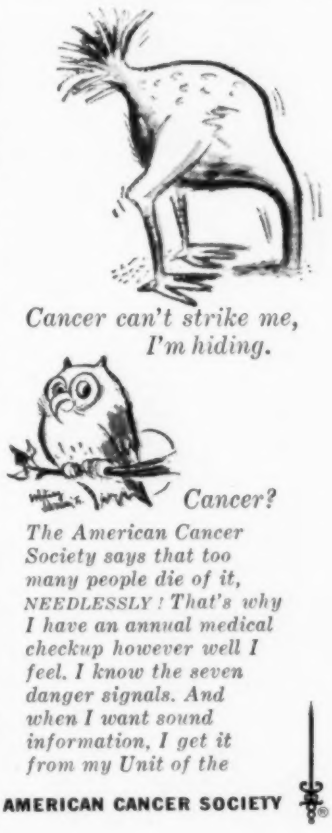
This is really a prologue to *The Principles of Disaster Planning For Hospitals* and should be read first.

Principles of Disaster Planning For Hospitals. *By Committee on Disaster Planning. Paper; price $1.50. Pp. 23. The American Hospital Association, Chicago, 1956.*

The introduction in this pamphlet is its own review: as stated ". . . an outline of the general principles of hospital disaster planning which will serve as a guide and checklist to be used in developing its specific plan."

The outline is elaborated from six headings (1) Steps To Take To Prepare the Hospital for Community Disasters, (2) The Disaster Plan, (3) Evacuation, (4) Expansion, (5) General Considerations, and (6) Community Planning.

The reviews here published have been prepared by competent authorities and do not represent the opinions of the American Physical Therapy Association.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Our Book Reviewers for November

Edna M. Blumenthal, Director of Rehabilitation, North Carolina Cerebral Palsy Hospital, Durham, North Carolina.

H. D. Bowman, M.D., Professor of Physical Medicine, University of Wisconsin, Madison: Editor, *Journal of Physical Medicine,* Baltimore.

Louise D. Christman, Major, AMSC, Chief, Physical Therapy Section, Walter Reed Army Hospital, Washington, D.C.

Constance Green, Director of Physical Therapy, Bouvé-Boston School, Medford, Massachusetts.

Helen M. Mendler, Capt., AMSC, Physical Therapist, U.S. Army Hospital, West Point, New York.

What's New . . . . . .

180. Heat Mitts

Winco Heat Mitts are equipped with precision set dual thermostats to prevent overheating. The manufacturer states they are approved by Underwriters' Laboratories and may be plugged into any electric outlet. The Mitts provide a steady, dry heat and sanitary inner mitts are supplied. Winco Affiliates, Inc.

181. Aluminum Tub Seat

Komfort-Sitz, aluminum tub seat, provides additional elevation and comfort to those who cannot or prefer not to sit flat in a bathtub, the manufacturer states. It may also be used in a tank, pool, or whirlpool. Over-all height, 6¾ inches; width, 15 inches; length, 16 inches. Rubber bumpers protect tub surfaces. Will-Mark Manufacturing Company.

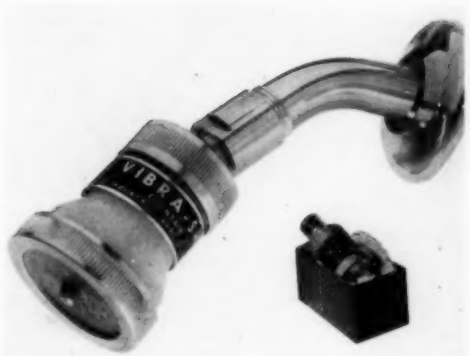
For more information on items write to The Physical Therapy Review, 1790 Broadway, New York 19, N. Y.

New items which may be of interest to physical therapists will be mentioned in these pages each month. The accompanying explanations are made by the manufacturers and have not been investigated by the *Physical Therapy Review.*

182. Stocking-Aid

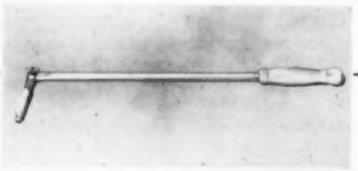
Stocking-Aid, a new device for putting on stockings and pulling them up into place, has been especially designed to help those who are unable to bring their feet into contact with their hands. The "Stocking-Aid" is particularly useful to women for pulling on nylon hose with no danger of tearing or snagging. According to the inventor, patients can familiarize themselves with its simple operation in a very short period of time. A complete set of instructions comes with the "Stocking-Aid." Fascole Corp.

183. Vibra-Shower



Vibra-Shower is a new kind of shower-head with vibratory action, said by the manufacturer to massage away tension, tiredness, and nervous fatigue. The new therapeutic head changes the water's course from a straight flow to high speed jets.

Vibra-Shower can be easily and quickly installed by anyone on any regular, standard size shower arm. It is guaranteed by the manufacturer and comes gift-boxed with complete instructions. Reglar Co.



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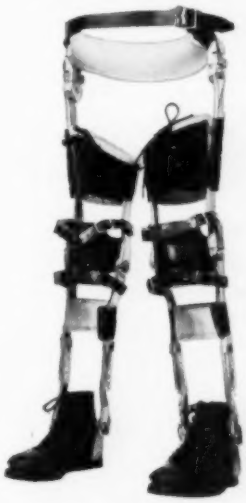

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Research in Atherosclerosis. Frederick J. Store, J. Am. Dietet. A., 32: 309-311, April 1956

Classified WANT-ADS

Wanted MALE physical therapist for a 400-bed general hospital. Salary good; 40-hour week; 3 weeks' vacation; 2 weeks' sick leave. Contact Dominic A. Donio, M.D., Director of Physical Medicine and Rehabilitation, St. Luke's Hospital, Bethlehem, Pa.

IOWA'S LARGEST PRIVATE HOSPITAL now planning expansion of facilities needs qualified physical therapist. Institution includes 100-bed Raymond Blank Memorial Hospital for Children. Post-polio cases, in- and outpatient work. Competent professional staff and assistants, excellent working relationships. Apply Anthony D. Damiani, Personnel Director, Iowa Methodist Hospital, Des Moines, Iowa.

QUALIFIED PHYSICAL THERAPISTS for immediate placement in established Crippled Children's Hospital and rapidly growing comprehensive Rehabilitation Center treating wide variety of patients. Well equipped therapy department with pools and adequate space. Employee benefits. Maintenance if desired. Write: Jack E. Pearson, Morris Memorial Hospital and Rehabilitation Center,, Milton, West Virginia.

IMMEDIATE PLACEMENT: Physical therapist with nursing background for county Physically Handicapped Persons Dept., 35-hr. week, pension plan, paid vac., accumulative sick leave, no uniform required. For further info. contact Broome County Physically Handicapped Persons Dept., County Office Bldg., Binghamton, N. Y.

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CHIEF PHYSICAL THERAPIST: for modern hospital located on Chicago's northshore near parks and beaches. To head newly equipped expanding department. Excellent starting salary; liberal employee benefits including one month's vacation and free Blue Cross. For more information, contact Personnel Director, Louis A. Weiss Memorial Hospital, 4646 Marine Drive, Chicago, Illinois.

PHYSICAL THERAPIST needed for full time work in new well equipped office of two orthopedic surgeons. Located in one of Chicago's beautiful North Shore suburbs. Excellent starting salary, 38 hour week, paid vacation. Write Dr. Louis Scheman, 695 Roger Williams Avenue, Highland Park, Illinois.

WANTED: Physical therapist for suburban Philadelphia public health nursing agency to give consultant services to staff of 25 nurses and direct services to homebound patients. Salary dependent upon experience. Social Security, retirement, 40-hour 5-day week. Liberal personnel policies. Position open now. Apply Executive Director, Community Nursing Service, Delaware County, 60 S. Lansdowne Ave., Lansdowne, Pa.

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PHYSICAL THERAPISTS. Unusual opportunity for creative work in 1,172-bed general teaching hospital. Civil Service Classification and benefits. Starting salary $3,600-$4,500, depending on experience. Write: Dr. Josephine J. Buchanan, Chief, Dept. of Physical Medicine, D. C. Gen. Hosp., Washington, D. C.

OPENING in CEREBRAL PALSY SCHOOL in new air-conditioned building. Very good salary and liberal personnel policies. Experience in cerebral palsy desirable. Write: Mrs. A. M. Inman, Director, 1601 Gatewood Ave., Greensboro, N. C.

PHYSICAL THERAPISTS (staff or administrative) interested in working in New York State contact Mr. Jay Schleichkorn, Director of Clinical Services, United Cerebral Palsy Associations of N. Y. S., 1475 Broadway, New York City 36.

WANTED: Physical Therapist for Anna Hadley Hakes Memorial Clinic at 71 Spencer St., Winsted, Connecticut. This is a private clinic with hospital connections.

(continued on next page)

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PHYSICAL THERAPIST: Expanding department in medical school-teaching hospital. General work with in- and outpatients. Salary commensurate with training and experience. Annual paid vacation, holidays, and sick leave. Experience not necessary. Write Edith M. Vail, Phys. Ther. Dept., N. C. Baptist Hospital, Bowman Gray School of Medicine, Winston Salem, N. C.

PT CONSULTANT wanted for staff of Illinois Association for the Crippled. Experience required in PT techniques, knowledge of public relations and community relationships would be helpful. Must have car, and be willing to travel throughout the state of Illinois. Contact: Mrs. Elizabeth L. Jameson, Program Consultant, Illinois Association for the Crippled, 2325 South 11th Ave., Broadview, Illinois.

QUALIFIED PHYSICAL THERAPIST: Experienced in rehabilitation technics to give treatment and instruct home bound patients; to teach and supervise visiting nurses in appropriate procedures. New position. Salary commensurate with experience, regular increases. Generous paid vacation, sick leave, legal holidays, 40-hour week, group hospitalization, retirement benefits. Write Anna C. Gring, Executive Director, Visiting Nurse Association, 87 Washington Avenue, Bridgeport 6, Connecticut.

KANKAKEE, ILLINOIS: Wanted a qualified PT with some experience, for newly established outpatient program. Excellent salary, liberal personnel benefits. Case load varied physical disabilities, children and adults. Contact: Mrs. Elizabeth L. Jameson, Program Consultant, Illinois Assn. for the Crippled, 2325 South 11th Ave., Broadview, Illinois.

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AURORA, ILLINOIS: Qualified PT wanted for expanding rehab. program. No experience necessary; female preferred. Generous personnel benefits, interesting case load, physical disabilities, children and adults. Contact: Mr. Sam Alschueler, 32 Water St., Aurora, Illinois.

NEEDED: STAFF physical therapists for approved hospital and clinics. Varied referrals by qualified staff. Forty-hr. week and liberal personnel policies. Salary range $345 to $435. California licensure required. WRITE: Elizabeth W. Thomson or Administrator, Kaiser Foundation Hospital, Fontana, California.

WANTED: QUALIFIED physical therapist to work with cerebral palsied children. Only outpatients treated. Preschool and public school at Center. Work under direction of experienced orthopedic surgeon. Near Houston and Galveston medical centers. Good salary and other benefits. Write: Leon Legler, Chm. Exec. Comm., Baytown Society for Crippled Children, 1209 Morris, Baytown, Texas.

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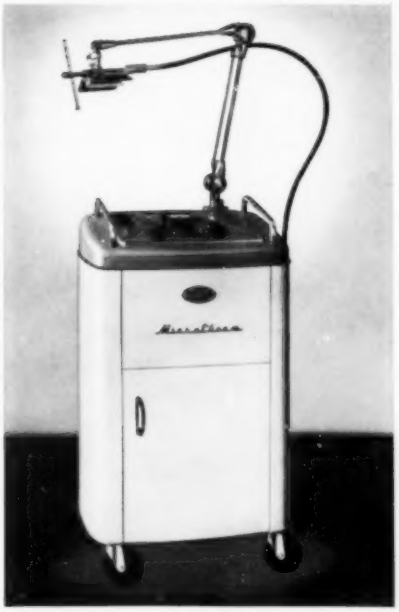

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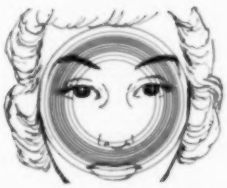

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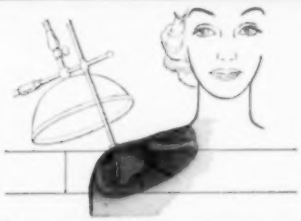

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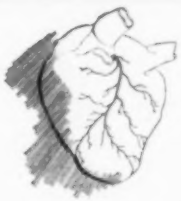

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